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I. Introduction

Rodents and other wildlife can play an important role in the transmission of pig diseases such as leptospirosis, salmonellosis, swine dysentery, erysipelas, intestinal spirochaetosis and toxoplasmosis. These diseases can compromise the health and growth of pigs, and may also affect people working in close proximity with the animals. Rodents can spread or accelerate the spread of diseases from contaminated areas to uncontaminated areas via their droppings, feet, fur, urine, saliva, or blood. As an example, rats may travel through infected manure of sick pigs and then contaminate feed or water several hundred feet away. Rodents, if eaten by pigs, also can directly transmit diseases. Rodents are also responsible for a vast amount of damage, through their gnawing and burrowing to wiring and shed infrastructure. A number of piggery fires have been caused by rodent activities. When rodents live around farm buildings, they are a food source that can attract predators such as foxes or stray cats, and these, in turn, may contribute to disease problems. An effective disease barrier system cannot be achieved or maintained without good rodent control.

On-farm rodent control programs that rely on rodenticides alone to control & manage rodent problems aren't effective or sustainable. Sound rodent control management is only achieved by:

- Reducing food and water supply
- Reducing shelter
- Ongoing monitoring and surveillance

These objectives can be achieved through an integrated approach made up of five basic steps:

1. Prevention & Hygiene
2. Monitoring
3. Non-chemical solutions
4. Chemical Solutions-Baiting
5. On-going monitoring

This booklet will provide the information to allow producers and individual farms to set up their own Rodenticide Stewardship Plan. Implementing an on-farm Rodenticide Stewardship Plan, is not a huge task. The standards developed for on-farm quality assurance (QA) programs such as the Australian Pork Industry Quality Assurance Program (APIQ[✓][®]) are consistent with the requirements of a farm's rodenticide stewardship plan. For example, a properly created and implemented APIQ[✓][®] QA system will complement the requirements of the Rodenticide Stewardship Plan through compliance to multiple basic APIQ[✓][®] Standards (Table I shows the APIQ[✓][®] Standard performance indicators and how they link to and reinforce sections of the Rodenticide Stewardship Plan).

Table 1.1 Links between the APIQ[✓]® Standard performance indicators and sections of the Australian Pork Industry's Rodenticide Stewardship Plan

APIQ [✓] ® Module/ Standard	APIQ [✓] ® Standard performance indicator	Farm Rodenticide Stewardship Plan
2 /2.1 Food Safety Risk Analysis and HACCP-based Food Safety and Biosecurity plan	2.1a All Potentially Contaminated sites and sources of contamination are identified and plans are in place to minimise risk to pigs	Farm Stewardship Plan- 5.1 Recommendations for handling and use of rodenticides
2 /2.4 Medication and Chemical Management	2.4c Piggery Medications and Chemicals are stored, handled and used in accordance with Manufacturer's instructions (Unless APIQ [✓] ® Performance indicator 2.2c applies)	Farm Stewardship Plan- 5.2 Recording Bait Use
4/4.4 Pest Control Procedures are in Place	4.4b Risks from rodents and other pests accessing pigs, feed stores and bedding are controlled through an appropriate pest control program Pest control products are not accessible to pigs	Farm Stewardship Plan- 2. Prevention and Hygiene 3. Monitoring 4. Non-chemical Solutions 5. Chemical control-Bait selection 6. Ongoing Monitoring and Control
6/6.2 Piggery Upkeep	6.2a. The premises are maintained in a clean and tidy state. 6.2b. Repairs and maintenance to buildings and equipment are carried out in a timely manner 6.2c. Accumulated rubbish, redundant equipment, or scrap metal is kept in controlled areas separate from livestock, feed storage, and public access. 6.2d. There is a weed/grass control program in place which prevents excessive build-up of weeds/grass.	Farm Stewardship Plan- 2. Prevention and Hygiene



2. Prevention and hygiene

Keeping rats and mice out of pig sheds poses special problems because for a rodent, pig sheds provide everything they need including food, water and shelter. When planning and implementing rodent control, consider your farm as three major areas:

- Fence-line - farm perimeter and open areas outside and around sheds and buildings,
- Outside - perimeter of shed or building, and
- Inside - inside pig sheds, feed mills, storage areas etc.

2.1 Fence-lines or farm perimeters¹

Fence-line or Farm perimeter. The farm perimeter can be defined with channel banks, crop margins as well as fence-lines. All these areas can make for ideal rodent habitats as they provide food, cover to evade predators as well as nesting sites. These should be kept as clear as possible to reduce shelter for rodents. It's especially important to slash or spray weeds before seed set and remove all debris as soon as possible. If high rodent numbers are forecast, set and maintain bait stations (your state department of agriculture or environment will be able to assist with forecasted rodent numbers) along the farm perimeters. First and second generation rodenticides are not registered for fence line baiting, and currently only one vitamin D3 bait is registered for fence line baiting. Therefore, you need to check labels prior to purchasing rodenticides specifically for perimeter or fence line baiting.

2.2 Outside Areas

Hay or silage storage. Check hay bales/stacks, or silage rolls or stores for rodent activity. If any are damaged or show signs of rodent activity, feed these out first.

General. Make the area surrounding a piggery as unappealing as possible to rodents. This can be achieved by:

- Keeping sheds and surrounding clean – don't provide a shelter for rodents. Tips to achieve this include:
 - Get rid of rubbish, or anything between and next to sheds, that rodents can use for hiding, resting, and nesting
 - Cover pit outlets to block access to rodents
 - Removing/controlling weeds so that there is at least 2-3m clear width around sheds
- Keep up with maintenance requirements. Tips to achieve this include:
 - Routine inspections and repairs to identify areas needing maintenance
 - Check maintenance records regularly to ensure that repairs to reduce rodent access points are maintained

¹ A fact sheet for Mouse control for grain growers available at this link is a useful reference for control of mice outside sheds.<http://www.cse.csiro.au/Research/tropical/rodents/Farm-man-pract-mouse-green.pdf>

- Repair broken fittings and mesh as these provide additional access points for rodents
- Eliminating rodent access to feed. Tips to achieve this include:
 - Keep lids on silos
 - Check and maintain silos to ensure that no access holes develop
 - Clean up feed spills promptly
 - Ensure feed ingredients are stored in a rodent proof shed

Use Appendix I (Farm plans for rodent control) to sketch out plans of the farm and sheds and identify all areas of interest including nest sites, water, burrows, runs and feeding sites outside of the shed. These farm plans can also be used to record placement of numbered bait stations outside sheds, traps inside sheds etc.

2.3 Inside

Buildings. A lasting form of rodent control is to “build them out” by eliminating all openings through which rodents can enter a structure. Where feasible, rodent-proof all places where feed is stored, processed, or used. By gnawing, rats can gain entry through any opening greater than 12mm across. Mice can enter a building through any opening larger than 6mm across. To prevent rodent entry, seal all such holes with durable materials. Stainless steel wool, packed tightly into openings, is a good temporary plug. To close openings or protect other areas subject to rodent attack, use materials like concrete, galvanized sheet metal, wire mesh (less than 5mm), aluminium or bricks (Figure 1). Plastic sheeting or screen, wood, rubber, or other materials that are easily chewed by rats or mice are not adequate for sealing openings used by rodents. Openings around augers, pipes, and wires where they enter structures should be closed with mortar, masonry, or metal collars. A common entry point for mice into buildings is the unprotected end of corrugated or ribbed metal siding. If not blocked with metal or mortar, these openings provide access into wall spaces and the building’s interior. Rubber or vinyl weather protection strips are quickly eaten through. Buildings should be designed or modified so that metal panels push directly up against building edges or foundation.

Doors, windows, and screens should fit tightly and be kept closed as much as possible. It might be necessary to cover the edges with metal to prevent rodent attack. Depending on the age and type of construction, it might not be feasible to rodent-proof the building. In such instances, more attention must be given to other techniques of rodent control. Rats can be discouraged from burrowing near foundations by laying a strip of coarse gravel around their perimeter. Gravel should be at least 2-3cm diameter and laid in a band at least 0.7m wide and 0.2m deep (Figure 2). Rat burrowing under concrete slabs or foundation walls can also be prevented by installing a buried curtain of galvanized steel wire screen with a mesh usually between 0.5 and 0.2 inches, extending down 0.3 to 0.5m with a lip at the bottom extending outward 0.3m.

Eliminating opportunities for rodents to remain or feel safe in the environment as well as ongoing and frequent monitoring will help to prevent rodents from settling into the piggery environment as well as reducing food and shelter opportunities.



Figure 1. Small gauge wire (< 5mm) can exclude rodents.



Figure 2. An example of compacted road base along shed parameters to prevent rodents burrowing.



Feeding systems. Minimising rodent access to feed lines and feeding systems in general will assist greatly in rodent control as the availability of food influences their reproductive ability and population numbers. The presence of a continuous alternative food supply will lead to poor acceptance of toxic baits by rodents. Automatic feed lines that are either missing the access capping or the capping is not secured properly, just become a smorgasbord for rodents. Likewise, feeders that are uncovered just provide additional access to rodents (Figure 3). Free access to feeding systems also provides rodents greater opportunities to contaminate feed with urine and droppings. Further reduce rodent access to feed by:

- Covering feeders with tight-fitting lids
- Storing bagged feed up on pallets, well above floor level, and set away from walls
- Picking up feed spills when they occur
- Try and ensure that sheds or rooms where feed ingredients are stored, are made and remain rodent proof i.e. check these sheds or rooms often for rodent presence and damage.

Figure 3. Reduce accessibility to feed stations by covering feed, reducing feed spills and appropriate storage.





3. Monitoring

Before starting a rodent control program it really pays to investigate where the signs of activity are occurring and concentrated.

Burrows, runs, fresh droppings and rodent nests (made from fine shredded paper or other fibrous material) are often found in sheltered locations while insulated walls and ceilings are common nesting locations for rodents, especially mice. In pig sheds, roof rats usually build their nests in roof and wall cavities however they can also burrow into the ground inside and outside of pig buildings. Search for evidence of rodent activity on above-ground structures including walls, roof beams, pipes, chords, windowsills, feeding systems and rails (Figure 4). Rats are very good climbers and often use overhead structures to enable them to move around the piggery.

When present in relatively high numbers, rats and mice occasionally can be seen during daylight hours, but they are most active at night, particularly just after dusk. This activity can be recorded on the Farm Plans for Rodent Control and the Piggery Rodent Monitoring Record (Appendix 1 and 2).

Figure 4. Damage to insulation caused by rats.



3.1 Problem identification-extent and surveillance

The number of burrows, runs and fresh droppings will define the extent of an infestation with the density of fresh signs broadly indicating the density and location of rodents. Look for burrows against the outside walls of the buildings, under discarded machinery, pallets, tyres and around the base of straw or hay stacks. Record this activity on a map of the farm and piggery site (Appendix I - Plan A). Spreading talc at the entrance of burrows and checking for prints or any disturbance of the talc, is a simple way of determining if the burrows are active or have been abandoned. This technique can also be used on exposed above-ground structures such as roof beams or window sills that rodents use to move from one area to another. Another method of gauging rodent activity involves taking a walk at night around and in the pig sheds; don't turn on the lights, just use a torch and move as quietly as possible (Figure 5).

Figure 5. Monitoring rat population numbers provides a way to determine if control measures are effective.



3.2 Aspects of rat biology relevant to control

If you've located an area of high activity and you want to start treatment, try not to disturb the area by removing shelter, rubbish etc. Although keeping sites clean is one of the best preventative actions in rodent control, disturbing the rodents' environment may interfere with treatment as the rodents will seek other places to hide. Rats especially are very smart and are very suspicious of change. The best course of action is to lull them into a false sense of security by maintaining their environment as it is, while you implement your control plan.

Rats are also creatures of habit and tend to stick to only a few favoured feeding sites (Figure 6 and 7). They will access these feeding sites by well-travelled and safe paths which go from their burrows or nests to where they prefer to feed. Rats feeding activity tends to commence at dusk, and peaks in the very early hours of the morning, and then drops steadily, as the vast majority of rats will take shelter in their burrows or nests during the day.

Rats can be very reluctant to try new food (including baits) as they are very smart, have poor eyesight (but a good sense of smell), are very suspicious of new objects and unable to vomit. It might sound like a strange combination but these are the key points that must be addressed when encouraging rats to try new baits.

When faced with a new bait/food, rats will only eat very small amounts; if it makes them feel sick or they don't like the taste they won't continue to eat the new food, or sample it again in the future. Rats also observe other rats and will learn to avoid materials if other rats eat it and die quickly. This can result in the entire colony learning to avoid that bait/food in the future (www.ratcontroltricks.com/ratpoison). On the other hand, when rats detect or decide that a food is acceptable, they will mark these foods quite heavily with their urine which indicates to other rats that the food is safe and "preferred". These urine marks attract other rats to that food source (Galef and Beck 1985).



Figure 6. Brown rat (Norway rat) – *Rattus norvegicus*, often found in burrows and living underground. are effective.



Figure 7. Black rat – *Rattus rattus*, often have a long tail providing balance when climbing.



Rats usually don't sit and eat their fill at a food site: they usually tend to make several brief visits to only 3 or 4 different feed sources, using the same runway or path to obtain a meal, which they will then take away to eat in safety to avoid conflicts with other rats. Small particles, such as cereal grains, may be all eaten after being removed, but larger items may only be partially eaten with the rest abandoned. Food transfer by a rat can pose a risk to other animals if the abandoned food is poison bait. Placing bait directly into a rat's burrow or nest may make feeding safer for the rat, but unfortunately it does not stop unintended visitors stealing the bait particles (<http://adlib.eversite.co.uk/adlib/defra/content.aspx?id=000HK277ZX.0B4BN4JM8F84JL>).

Some manufacturers advise that after baits are placed in rat burrows, the burrows should be then filled in, and the soil tapped down strongly to seal the burrows. If you fill in the burrows too early in the process, all you will succeed in doing is make the rats move elsewhere, and you will not really know if you have succeeded in clearing that burrow. The key to burrow baiting is to get the bait as far as possible into the burrow (a PVC pipe may make a very useful tool to assist this process). Then block the burrow entrances with crunched up newspaper. Return the next day, and if paper has been knocked out, rebait (if required) and place paper back in hole. Repeat as needed. Once paper stops getting thrown out you know you have gained control and then fill in the burrow.

Rats have very poor eyesight, but they have an incredible sense of smell which can be used to make new baits and bait stations attractive to rodents. A study has shown that pig feed plus walnut oil (because of the vanilla scent) had the highest test bait acceptance value, followed by peanut butter and then wax blocks plus walnut oil. Try placing bait stations with no bait initially, just for a few days and then bait with food that the rat is currently eating mixed with peanut butter until they get comfortable with the stations. Then remove most of the peanut butter and replace it with a bait that has been smeared with peanut butter (and only just a smear). If this doesn't work, try a couple of drops of linseed oil or vanilla essence (short sprays of the vanilla essence from a spray bottle also work well).

Sometimes rats will visit the bait station but not consume much of the bait so check to see if there is rat activity (droppings, footprints, gnawing) and if not, consider moving the station to an area with more rat activity. When using attractants it's important to place them either directly on the bait or behind the bait (at a place only accessible to the rat after most of the bait has been eaten). Collecting fresh (soft) rat droppings and placing them into the bait station can also make the station more attractive to the rats. There are also a number of commercially available rodent attractants (Appendix 3) that will assist in attracting rodents to baits. It's also important to consult a professional pest exterminator as they will have a number of tips and suggestions to assist with rodent management.

In some respects, mice are similar to rats in much of their behaviour (Figure 8). But mice are more inquisitive than rats and do not tend to avoid new traps, baits or bait stations as rats would. Mice also tend to visit numerous feeding points each night, very unlike a rat which will only visit 3 or 4 feeding points each night. Mice also have multiple nesting locations and may change nesting points from night to night.

Figure 8. House mouse – *Mus domesticus*





4. Non-chemical solutions

If the rodent levels are low and infestations are small, or in areas where rodents have become bait shy, alternative measures to controlling rodents are sometimes implemented. These methods include:

- Shooting (rats only and must be carried out by a suitably skilled and licenced operator);
- Trained dogs (may not be useful in severe infestations);
- Trapping, and
- Electronic (ultrasonic/electromagnetic) pest control.

Of these four solutions, trapping and electronic pest control are by far the most common.

4.1 Trapping


Trapping is an effective way to control rodents. House mice are relatively easy to trap, but rats require more skill and labour. Try trapping first where rodents are few; severe infestations will likely require additional measures. Trapping has several advantages: (1) it does not rely on potentially hazardous rodenticides; (2) success is easily visible; and (3) it allows for disposal of the rodent carcasses, thereby eliminating dead animal odours which may occur when poisoning is done within buildings.

There are several different types of commercial traps available for both rats and mice that vary according to the number of rodents they trap, whether they use bait, best position for placement, and whether they kill or just trap the rodents. The simple, inexpensive wooden mouse or rat trap is very effective. Set them so the trigger is sensitive and will spring easily, using peanut butter as the lure. Multiple-capture live traps for mice are effective and save service time. Bottle-traps over a bucket or 44 gallon drum are a cheap and easy way to capture many mice without the use of poisons.

Traps should be set close to walls, behind objects, in dark corners, and in places where the rodent activity is evident i.e. around burrows and along their runways. Rats usually run along the edges of walls, so setting them flush to the wall is recommended. Don't use powdered pesticide preparations to track rodent activity; only use talcum powder to track where rodents are active. Specially prepared non-toxic baits are also commercially available. These non-toxic baits contain a luminescent dye² that can be seen very clearly under Blacklight or UV torchlight, easily allowing tracking of the faeces of mice and rats in some difficult areas. Mice are more inquisitive than rats and will approach a new trap readily. So if you've set a mouse trap and you don't catch a mouse in the first night, the trap has probably been placed in the wrong place. But if trapping rats is your focus, the best way to make sure that rats will not avoid a trap, is to leave traps un-set but baited for a few days (rats are very cautious, they will often not approach a trap). Not setting the trap initially, allows rats to overcome their timidity, and they'll approach a set trap readily after that time.

Traps may be placed on ledges or on top of pallets of stored materials if mice or rats are active there. Where possible, place traps so that rodents will pass directly over the trigger as they follow their natural course of travel, usually close to a wall. Some mouse traps have enlarged triggers that catch rats or mice when they travel over them.

2 Detex® Blox Non-toxic rodent monitoring bait Bell Laboratories Inc.



When set correctly, it is possible to catch rodents that are not attracted to baits. If possible secure traps inside a bait station or with a loop of wire or cable tie.

Use enough traps to make the campaign short and decisive. Mice seldom venture far from their shelter and food supply, so space mice traps no more than 3m apart in areas where mice are active. When using mouse traps, it may be best to trap intensively for 2 to 3 weeks and then “rest” for a couple weeks. This may save some labour costs and will help prevent rodents from becoming “trap-shy.” Place multiple-catch traps in areas where mice are persistent and where mice are gaining access to the building (for example, on both sides of doorways). Multiple-catch traps (for mice) should be checked frequently to remove captured mice.

There are also a number of websites where plans for home-made traps can be downloaded. These include:

- <http://macgyverisms.wonderhowto.com/how-to/5-clever-ways-make-simple-no-kill-trap-for-mice-rats-0147621/>
- www.instructables.com/id/Mouse-Rat-Trap-from-Recycled-Water-Bottle/
- <http://pestcemetery.com/3-easy-home-made-mouse-traps/>

4.2 Electronic pest control

Electronic pest control measures are used to control a number of rodent and insect pests. The two types of electronic pest control devices that are available for rodent control are:

- Ultrasonic, and
- Electromagnetic devices

Ultrasonic pest control. Ultrasonic pest controllers work by emitting a high frequency sounds, not detectable by humans that are disruptive to pests³. The sounds are supposed to cause what is known as an audiogenic seizure i.e. the noises cause something like an epileptic response in the pests and they scurry away from the sources of the noise. The fact that these type of noises can cause these seizures in rodents is well known and the response has been used in human medical research to test anticonvulsant medication for epilepsy. But it appears that this effect is not apparent in all rodent populations, and quite often the rodents may be affected for a while but then adjust to the new sound. Reports of effectiveness have been mixed, so prior to purchasing specific units, it’s worth researching various units and their reviews to assess which would be more suitable for the farm. The ultrasonic units should be placed in areas in the sheds where the ultrasonic signals won’t be interrupted or muted by walls and other shed structures.

Electromagnetic pest control. Electromagnetic forces are connections that occur between electrically charged particles. These forces play a significant role in determining the internal properties of most objects encountered in every day normal life (<https://en.wikipedia.org/wiki/Electromagnetism>). When electromagnetic devices are plugged into a power supply, they use the existing electromagnetic field in the building or room and then pulse at predetermined intervals. These pulses are claimed to affect the nervous system of both insects and rodents. As with the ultrasonic devices, some units appear to be more effective than others. So research various types to assess which units would be more suitable for your situation. There are also units now available in Australia that provide both ultrasonic and electromagnetic pest control technologies in a single unit.

3 www.nachi.org/ultrasonic-pest-repellers.htm?loadbetadesign=0



5. Chemical control-bait selection⁴

Rodenticides are pesticides designed to kill rodents (Figure 9). Both anticoagulant and non-anticoagulant rodenticides are available. Rodent baits are available in several forms. Grain baits in a loose meal or pelleted form are available in small plastic, cellophane or paper packets. These sealed “place packs” keep bait fresh and permit easy placement of the baits. Rodents gnaw into the packets to feed on the bait. There are also non-toxic chemical deterrents (Appendix 3) that have been used in situations where toxic baits are not suitable. However, their suitability, cost effectiveness and efficiency for on-farm use has not been determined.

The quality and quantity of alternative feed already available to rodents (i.e. pig feed) will influence the effectiveness of poison baits, as baits are competing with this tasty existing food for acceptance by rats. Therefore, it is important that all access to alternative feed is reduced. This is very important because sufficient amounts of bait need to be eaten by the rodents for it to be effective, and appetising alternative food supplies will decrease the success of a baiting campaign.

Figure 9. An example of rodent baits before they are placed into a bait station.



⁴ A comprehensive list of rodent baits registered in Australia is found in Appendix 3

5.1 Recommendations for handling and use of rodenticides

Rodenticides should always be handled and treated with a great deal of cautiousness, as they are not only poisonous to rodents, they can also be harmful to pets, other livestock, wildlife and in sufficient doses, even humans. When using rodenticides:

- Read the Material Safety Data Sheet (MSDS) specific to the rodenticide you plan to use and follow all safety recommendations including those for protective clothing, outlined in the MSDS
- Do not eat, drink or smoke when handling baits
- Always read the label and follow label recommendations
- Store rodenticides in their original container: do not transfer to smaller food storage containers or something similar
- Bait stations must be numbered and labelled with a “POISON” sign
- Bait station location must be shown on a site map
- Baits must be placed in a manner where they can be checked easily and recovered if necessary
- Baits must not be placed where they can be accessed by children, pets, other livestock or poultry or wildlife
- Do not place baits anywhere where they could potentially contaminate food

Some general safety precautions should be followed in addition to those appearing on product labels. When checking on bait stations or handling baits remember to wear the appropriate safety gear specified on the label including disposable gloves (Figure 10). The use of gloves will reduce the human smell on the baits. Also remember to wash your hands and face thoroughly and change your clothes after handling used or new bait stations.

Figure 10. Wear appropriate safety gear when handling baits.





All rodenticides are sufficiently toxic to cause death to pigs and that pigs may feed on rodent carcasses. Therefore, pick up and properly dispose of any rodent carcasses that result from the use of toxic baits. Handle rodent carcasses with rubber gloves, long tongs, or shovels. Anticoagulant chemicals (which are found in the first and second generation rodenticides) are stored in the body of the rat and don't break down in the time it takes the animal to die, so it is essential to remove any carcasses to ensure pigs don't consume them.

Label all bait containers and stations clearly with appropriate warnings, and keep unused bait securely sealed in its original airtight container. If baits are stored with other chemicals, be sure they are packaged in airtight containers to prevent absorption of foreign chemical odours that will reduce the baits' acceptance by rodents.

Carefully follow label directions. Remove and destroy all uneaten bait at the end of the poisoning program. When using permanent bait stations, properly dispose of any old, spoiled, or contaminated baits. Bait should always be placed in bait stations and bait stations should always be placed around the perimeter of the shed (not inside the shed) and other areas of the farm.

5.2 Recording bait use

As with the use of many other agricultural chemicals, recording bait use and placement is not only prudent, it's a requirement of use for many of the rodenticides available in Australia. In addition, regulators in most Australian states require that either records are kept when using baits to control vertebrate pests including rodents or at the very minimum, rodenticide label directions are followed. Rodenticide use can be recorded by using the Rodent/Pest Control Record Template (Appendix 4).

5.3 Anticoagulant rodenticides

About 90% of the commercially available rodenticides have anticoagulants as their active ingredients. Rodents like many other animals need Vitamin K to make the blood clotting agents that protect them from bleeding too much. Livers make a special enzyme that allows their bodies to recycle Vitamin K. Anticoagulants interfere with the blood clotting process by stopping this enzyme from doing its job. An animal's body will have a small extra store of this enzyme, but if an animal is exposed to enough anticoagulant, the supply of Vitamin K will run out and internal bleeding may begin (<http://npic.orst.edu/factsheets/rodenticides.html>).

Generally, the anticoagulants in the baits are used at very low levels, and bait shyness does not occur. Anticoagulants used in rodenticides are known as either single-dose (second generation) or multiple-dose (first generation) anticoagulants. Second generation anticoagulants were developed to control rodents that were resistant to first generation anticoagulants, are much more potent and take a much longer time to be eliminated from the body.

Coumatetralyl and Warfarin are first generation anticoagulants⁵. Examples of rodenticides that contain coumatetralyl are:

- Racumin Rat & Mouse Blocks
- Racumin 8 Tracking powder
- Racumin 8 Rat & Mouse Blocks

⁵ A more extensive list of rodenticides is available in Appendix 3.

- Racumin Rat & Mouse Paste, Bayer advanced home rat and mouse killer contains Racumin
- Ratex Mouse and Rat bait
- Readi Rac Rat and Mouse Killer

Examples of rodenticides that contain Warfarin are:

- Double strength Ratsak
- Rat Kill
- Rattex Gel
- Ratblitz
- Rattex Tracking Powder

DO NOT USE ANY RODENTICIDES THAT CONTAIN COUMATETRALYL OR WARFARIN

- Coumatetralyl is not registered for use in the USA and several EU countries.
- Remove coumatetralyl and warfarin products from your farm and dispose of them safely and appropriately under the guidance of your pest exterminator professional.
- Ask your pest exterminator professional for guidance in safe rodenticide clean-up. This may include cleaning areas inside sheds thoroughly by pressure washing, filling in rat burrows and cleaning up areas outside the shed by removing affected dirt.

Second generation rodenticides⁶ include:

- Baits that contain the anticoagulant Difenacoum: e.g. *Surefire Difenate, Time's Up, The Big Cheese Rat & Mouse bait Killer, Rodemise, Ratshot Blocks and Paste, Effect Rodent, Cougar, Atlas, Roban Rodenticide Blocks, Sorex*
- Baits that contain the anticoagulant Bromadiolone: e.g. *Mouse Off, Alley Cat, Contrac Blox, Tomcat*
- Baits that contain the anticoagulant Brodifacoum: e.g. *Tomcat II, SureFire Pellets, Sirdar, Rodenthor, Protect Us, Pestmaster, Brigand, 4Farmers Rat & Mouse pellets, All Weather PCT First Formula, Ditrac, Bromakil, Talon, X-Verminator, Maki*
- Baits that contain the anticoagulant Difethialone: e.g. *Rentokil Advanced Kil Blocks, Generation*

First Strike

- Baits that contain the anticoagulant Flocoumafen: e.g. *Storm and*
- Baits that contain more than one anticoagulant e.g. *Muskil*-contains Difenacoum and Bromadiolone

Baits should always be placed in bait stations and bait stations containing second generation anticoagulants should always be placed around the perimeter of the shed (not inside the shed) and other areas of the farm.

Seek the assistance of a professional pest exterminator before using second generation rodenticides as these rodenticides will require strict handling to reduce the chance of contamination.

6 A more extensive list of rodenticides is available in Appendix 3.



5.4 Vitamin D3 (Cholecalciferol) Rodenticides

There are other rodenticides that do not use anticoagulants but very few are registered for use in and around animal sheds. The primary rodenticides (besides the 1st and 2nd generation anticoagulant rodenticides) that can be used around animal sheds are the Vitamin D3 rodenticides. In Australia, the Vitamin D3 rodenticides include those sold by Bell Laboratories, under the brand name of 'Rampage®' and by BASF under the brand name 'Selontra®'. These baits contain cholecalciferol (Vitamin D3) and are toxic to rodents for the same reason they are important to humans: they affect calcium and phosphate in the body.

Vitamin D is essential in very small quantities but is very toxic for all mammals in larger doses, even causing death if doses are high enough. Rodents that consume the vitamin D3 bait, develop very high calcium levels if the poisoning is severe enough. After eating a lethal dose, the animal's body levels of free calcium are raised high enough for blood vessels, kidneys, the stomach wall and lungs to become mineralised i.e. undergo calcification, damaging them and leading further to heart problems and possibly kidney failure. The common 0.075% bait concentration is lethal to most rodents after a single intake of larger portions of the bait (death occurring 2-4 days after ingestion of the bait).

5.5 Bait Placement

Careful consideration and planning should be given to bait placement. Hasty placement of baits, carried out just to get the baits out there and in front of the rodents, may be at best, just a waste of baits, time and money, but at worst, poor bait placement may make the rodents bait-shy and leave the producer with a bigger problem.

Anticoagulant baits and baits under emergency use permits should not be used inside a shed; to stop any possible drift of rodenticides into pig contact, consider using anticoagulant meal and pellets for fence-line perimeter baiting only. Baits used near sheds or next to outside walls of shed should be placed in a tamper proof, firmly fixed (i.e. chained to a support beam) station where the bait is firmly fixed inside the bait station and unable to be removed. Wax blocks and paste are ideal to use in bait stations.

Bait boxes or stations enhance the efficiency of baiting as:

- they provide a secluded feeding area, and hold sufficient baits for other rodents
- they protect the bait from weather
- allow bait placement in difficult locations
- prevent the accidental spilling of bait, and
- protect non-target animals from eating the baits-never place bait stations where children, livestock, pets or non-target animals can disturb them.

Proper placement of baits and the distance between them is very important. Rats and mice will not visit bait stations if they are not located conveniently in areas of rodent activity. Bait stations should be placed between the rodent's food supply and their shelter. Place bait stations near rodent burrows, against walls (with the openings close to the wall), along the travel tracks or near burrows and in other places where rodents are active (Figure 11). For example, house mice rarely move more than 15m from their nests or food, so bait stations should be laid no more than 2-3m apart. Since rats will travel farther to feed, bait stations can be spaced 9m apart. Whenever possible, however, place rat baits directly into, or very close to, rat burrows. Also do

not use mouse sized stations when rats are present as they will just chew through them and expose the bait. What's more, rats are often suspicious of new or unfamiliar objects, so don't be surprised if rats do not use your bait stations for a while.

Bait stations should be large enough to accommodate several rodents at one time and should have at least two rodent-sized openings (3.8cm for mice or 6.5cm for rats) on opposite side of the station as rodents are more likely to enter a strange environment if they sense a likely escape route. Clearly label all bait stations with appropriate warnings as a safety precaution. To prevent bait stations from being tipped over, fasten them to the floor or wall. Secure the lids to prevent unwanted access to the bait. Loose and pelleted grain formulations, require specialised bait stations, as they can be easily spilled and because of the small size of the bait, rodents frequently move them to unsafe locations.

Figure 11. Bait station placed along the exterior wall of a pig shed.





Consider carefully whether you should be using loose and pelleted bait anywhere near the pigs or pig sheds. Block baits that can be fastened to the bait station by metal rods are often more suitable, as the rodents can chew them but not remove them from the station.

Avoid placing bait stations in areas exposed to full or afternoon sunshine, as the stations can become hot enough to melt the bait blocks. If they must be placed in direct sunshine, insulate or protect the station, or use non-paraffin based rodenticides.

If insects are a problem, treat the inside of the station with a low-odour ant control insecticide, applied at label rates and let the station dry before placing the baits. Do not treat the rodent baits directly with the insecticide.

When you've decided where the bait stations will be located around the piggery and sheds, number them and use a simple diagram or "mud map" to show exact placement of the numbered bait stations. You should also have a rodent/pest control table, which details all activities associated with bait placement and use e.g. shed, date of bait replacement, bait used etc.

Consider the following and discuss with your pest exterminator professional:

- Bait placement:
 - Do not place unsecured baits in holes in insulation or wood
 - Do not use tracking powder, loose meal or pellets
 - Do not apply paste to interior walls or insulation
 - Monitor bait uptake and replace when required to ensure bait is constantly available
 - Only use baits in bait stations and
 - If using baits outside try to locate them in-between the rodent nests and food supply and/or along the shed wall at ground level.

- Use tamper-proof, professional bait stations when using rodenticide paste, sachets and blocks:

Bait placement:

- Stations should secure the bait to ensure it is eaten within the station and cannot be removed
- Bait stations should be numbered and secured (with wire or lightweight chain) to shed posts so that they cannot be moved
- Bait in bait stations should not be able to be removed by rodents i.e. they should be wired in place, and
- Stations should be secured upright with rodent proof fastening e.g. lightweight chain.



5.6 On-going treatment

Bait station use and surveillance Rats should be allowed to become familiar with any bait station used. To allow this to happen, bait stations should be set out for 5-7 days prior to any food or bait being placed in them. If even with such preparation, the majority of rats take little or no bait over the first two weeks after baiting actually commences, then such treatments may not work, and baiting tactics should therefore be changed immediately.

As a rough guide for rats, one bait station placed every 9m should be sufficient to treat most infestations, but in heavy infestations, baits can be laid as close as 5m apart. Having too few bait stations set up, may only become apparent after the treatment has started. If more than one quarter of the bait stations have all the bait being eaten by rats at an inspection more bait stations should be added. But don't be too hasty to remove bait stations that have untouched bait, as rats need time to find them and overcome their natural caution about approaching them.

The amount of bait placed at each bait station depends on the refill schedule, the size of the rodent population and the product label. The rodenticide labels usually provide good guidance for amount of baits that should be placed. The most important thing to remember is that rodents must be able to eat baits whenever they want to, so that they eat a lethal dose as soon as possible. If baits are being eaten quickly bait stations should be re-filled more often to make sure that the bait is freely available (Figure 12.). As the rodenticide start to work and rodent numbers become less, the bait stations will not need to be refilled as often and the amount of bait per station can also be reduced. Sometimes rodents may lose interest in a bait and if this occurs, try replacing the bait with plain food until it becomes apparent that the rats are once again using the bait stations.

Pre-baiting. Pre-baiting describes the process whereby rodents are attracted to the bait and bait stations by feeding them non-toxic bait with an attractant, prior to the placement of the toxic baits. Rat biologists are somewhat divided as to the effectiveness of pre-baiting, but it may assist reluctant rodents to at least enter the bait station. Treatments with cholecalciferol (vitamin D3) and many other rodenticides may achieve better results if effective pre-baiting with non-toxic (plain) bait is undertaken first. At all bait points, it is best to lay plain food of the same type that will be mixed with the poison (or of similar type to the ready-to-use bait) until as many rats as possible are eating it. This is extremely important as rats must overcome their natural caution and fear to readily feed at these bait stations – roof rats in particular are reluctant to eat new foods with an unknown taste, texture or smell.



Figure 12. Regularly check bait stations and replace bait once consumed so that it is always freely available.



The size of the pre-bait placed must be enough to ensure that rats are attracted and are able to eat at ease. The pre-baiting period may take anything from 4-5 days to 3 weeks in large infestations. The plain bait should be checked daily, until it has become obvious that the rats have overcome their reluctance and are eating freely. The rats may be judged to be feeding freely when about the same total amount of bait has been eaten for 2-3 consecutive days. Then all the non-toxic bait can be replaced with poison bait at all points where the plain bait was eaten. Those rats accustomed to feeding on the plain bait should eat the poison bait on the first night. The quantity of calciferol bait at each point should be equal to that on the last night of pre-baiting. It is a false economy to cut the pre-baiting period short as this may increase the proportion of rats that have not eaten sufficient bait to kill them and so are likely to become bait shy.

This is extremely important as rats must overcome their natural caution and fear to readily feed at these bait stations. Attractants can play an important role in situations where rodents are avoiding bait stations and bait placements.

Disposal of old baits. Old baits, old bait stations and empty rodenticide storage containers should be disposed of in strict accordance with disposal recommendations outlined in the Material Safety Data Sheet (MSDS) specific to the rodenticide used.

Disposal of dead rodents. All dead rodents should be carefully collected and removed from areas where livestock, poultry, pets or native animals may access them. Dead rodents should be buried and disposed of in a way which makes sure that they are not accessible to scavengers. Gloves should be worn when handling feral rodents. Hands should be washed with warm water and soap immediately after handling any dead rodents.



Recognising poor control. How do we know when control measures aren't working?

An obvious one is no change or increases in the rodent population. Others include:

- Few indications that rodents have been visiting stations (bait stations are clean, bait untouched)
- The amount eaten at each station is very low compared to the rat population, and
- Fresh droppings show no signs of dye.

Possible reasons for these signs of poor control being apparent include:

- Poor bait station placement – bait stations need to be placed in areas (i) where the rats either visit frequently or (ii) they should be placed directly on rat paths or runways. The bait stations should also be placed in these areas a number of days before treatment actually starts.
- Caution towards bait station/baits – if rats are avoiding bait stations this can easily be seen by the appearance of a tracking marks around but not into each station. Quite often if room on the track is limited, rats will abandon this runway and find another track to the food source. This can happen in areas such as grain storage sheds that may not have much human activity i.e. the environment stays the same but have plentiful food resources.
- Unattractive/unappetising baits – If there is evidence of rodents visiting, going into the bait station and then just disturbing and not eating the bait, chances are that the bait is not attractive enough to tempt the rodent to change from their usual food to the baits. Also, if the bait stations are set too close to the rats' normal feed source, the rats may choose to fill-up on this feed, leaving the baits untouched. Try changing the bait and check if the rats find the new baits more appetising

Intense and continuous use of rodenticides can lead to learned bait avoidance, so an integrated approach by mixing up the control techniques is a sensible technique. If after a while (2-3 weeks), no baits are taken but rats continue to visit the bait station, remove the bait and replace it with a small amount of regular non-toxic feed. Once it is apparent that the rats are visiting the station and eating well, replace the regular feed with the bait. If rats continue to visit but still don't eat the plain feed, and it's been some time since treatment commenced, sometimes changing their surroundings by moving pig feeders, bags of feed etc. may assist.

Solutions for bait aversion. Sometimes treatments start off with the rats consuming baits well, only to have bait consumption drop off rapidly within a week or a few days. Before implementing any other actions, take a night time walk around the piggery to check if rodent numbers have dropped, as low bait consumption could mean that the bait control is working. On the other hand, if rat numbers are still quite high it's possible that rats have either developed an aversion for the bait or perhaps the rats may not find the baits appetising enough to eat as there is other, more easily accessible or attractive food that they prefer. If hygiene procedures have been implemented i.e. feed spills have been cleaned up, rodents have reduced access to feeders, then bait choice could be the issue.

If the aversion is due to a zinc phosphide or vitamin D3 baits, the surviving rats, after seeing other rats succumb to the effects of the baits may be put off eating the bait. The best way to overcome this is to change the bait used, the type of bait station and the location where the bait stations are placed. It's important to realise that the survivors will be completely put off by any association with the zinc phosphide or vitamin D3 baits so unless you remove all links to that bait, you are unlikely to succeed in getting the rats to eat the new baits. A follow-up baiting treatment is probably the best option to eliminate the remaining population. Trapping may also be an option if the remaining infestation is small.



When the aversion is due to an anticoagulant bait, it won't be necessary to change the bait stations or the location of the stations; just try another bait or replace bait with feed or a non-toxic bait until rats continue to feed regularly, and feed is disappearing. Once it is apparent that the rats are visiting the station and eating well, replace the feed with a toxic bait.

It would be useful to ask your pest exterminator professional about the use of different baits in a set rotation. Bait rotation is a very useful technique to manage long-term rodent control.

Recognising and correcting insufficient baiting. Not putting out enough baits will also affect how well you manage a rodent infestation. There are several signs which indicate that you need to increase baiting. These include:

- Observing persistent partial or complete takes (i.e. most or all the bait has been eaten) at specific bait stations
- Several bait stations in a row that are empty at each inspection visit
- Rodents stop eating bait at specific bait stations then start up again within a week
- Bait stations are empty but rodents are still very plentiful and there are very few dead rodents, and
- Fresh rodent droppings are coloured by the dye in the rodenticide bait.

If too few bait stations are put out and not enough bait is used, the rats that visit the bait station first will probably eat it out, leaving nothing for those that come after. Also, some rats may just go back and forth eating a small quantity each time. If the bait runs out too quickly, these rats making the frequent visits may not have been able to eat a lethal dose before the bait has run out. Rats may also visit the bait station to take bait away to hoard and eat in their burrow or at another location. Some rats have also been known to just store the bait/food without eating it, just stockpiling it in a little stash. Rats that tend to do this may empty a bait container before other rats have had a chance to eat the bait.

You should also check that the bait stations have not been accessible to other animals. Many animals (mice, cats, foxes, dogs) will eat bait from an unsecured or disturbed bait container. Birds such as finches or sparrows and even chickens may be able to reach inside the less complex bait stations that don't have baffles to stop them.

Re-colonisation of cleared areas may be very rapid if rats are close to the site. Baiting records will show consecutive takes at specific bait stations followed by inspections when no takes are recorded. Then takes begin again from those same points. Rats from more distant colonies (even a neighbouring farm) may move into a site during the course of a treatment. The rate of reinvasion from such places may be very low and difficult to detect. The only indication will be that fresh signs suddenly appear in areas thought to be rat free.

If none of above apply, then rodent resistance to the baits or poisons should be suspected. Resistance to cholecalciferol or Vitamin D3 has never been recorded and is probably unlikely. Resistance to most second-generation rodenticides has not been documented in Australia. Populations containing high proportions of resistant rats seldom just appear. Instead what has probably occurred is that there has been a sequence of treatments, which may or may not have been as effective as planned. These series of partially successful treatments have left an increasing proportion of resistant rats each time. At some point the number of resistant rats rises to a level where the reduced effectiveness of treatments becomes obvious. If good records of previous treatments are maintained, early detection of resistance may be possible before serious control problems emerge.

6. Ongoing surveillance and control

After a rodent infestation has been eradicated, surveillance and monitoring of the site should continue to make sure that when rodents return, a control program can be started immediately. One way that surveillance can be accomplished is through distributing boxes that are suitable for rodent nesting chambers or shelters around the now clear infestation sites. The presence of rodents in and around the containers can be monitored with tracking areas made of fine sand or smoothed mud to record footprints. Boxes can also be baited with non-toxic bait blocks that do not pose a problem to either non-target animals or rodents but would show tooth marks. Baiting can then begin as soon as rat signs appear. It's important to site the boxes or shelters in places that incoming rats are likely to colonise. Boxes need to be checked regularly to make sure that access to the shelter has not been blocked.

Ongoing surveillance is important to maintain control that has been achieved by a robust rodent control program. It is too easy to let your guard down and not pay much attention to rodent management for a couple of months, once you've achieved good control. Unfortunately, this habit leads to undoing all the work that it took to control the rodents initially. Keep in mind that a few rodents are likely to survive even the most thorough control effort. Also, rodents from nearby paddocks or sheds may invade pig sheds at any time. These rodents will multiply quickly if not kept in check with an ongoing control program. Therefore, it is important to establish permanent bait stations in farm buildings and around their perimeter. Fresh anticoagulant bait in these stations will control invading rodents before breeding populations become established.

Key APL Contacts

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Appendix I

Farm Plans for Rodent Control⁷

Draw on these grids your outdoor and indoor areas for rodent control. Highlight key areas of activity and where you plan to use bait stations for your eradication campaign. Number your bait stations/traps and mark numbers on the diagram. Also mark where any specific non-target species activity is seen and special care is needed.

Area Key		Rodent Activity Key	
	Building		Rodent Burrow
V	Door or gate		Bait Station
	Livestock (in paddocks)	X X X X	Rat activity
	Grain storage	/ / / / / / / / / /	Mouse Activity
	Dam/water		Rodent entry point
_____	Track	*	Non-target Activity
#	Hay/Straw		
X	Swamps or wetlands		
	Fences		

⁷ (Adapted from www.pestcontrol.basf.co.uk, <http://fera.co.uk/prodserv/cons/pestman> & Farm train www.farmtrain.co.uk – Rodent Control Record Book)



Appendix 2b

Table 2.2 Rodent Monitoring Record - Completed Template Example

Date	Shed /Area ⁹ Checked	Rodent Activity and Actions	Name & Signature of staff member who completed monitoring
5/10/15	All sheds	Most other areas ok very few rats to be seen. Dry Sow 1 saw 8 rats in a night walk. Increase bait block numbers from 2 to 5/station	P. Mitchell <i>P. Mitchell</i>
10/10/15	All sheds	Most other areas ok very few rats to be seen. Dry Sow bait stations all empty placed 5 bait blocks/ station	P. Mitchell <i>P. Mitchell</i>
17/10/2015	All sheds	Most other areas ok very few rats to be seen. Dry Sow bait stations some bait still remains including intact baits. Removed all old bait and placed 3 bait blocks/station	<i>P. Mitchell</i>
24/10/2015	All sheds	Most other areas ok very few rats to be seen. Dry Sow bait stations some bait still remains. Removed all old bait and placed 2 bait blocks/station	<i>P. Mitchell</i>
10/12/2015	All sheds	Very little rat activity during walk through in each shed. Saw one rat in finisher shed and one in Dry Sow 1 and Dry Sow 2- None in the others. Checked baits the next day and removed all old looking baits (stations 4, 10, 13-marked on map) and replaced with fresh bait.	<i>P. Mitchell</i>
23/12/2015	All sheds	As above - No baits were replaced	<i>P. Mitchell</i>

⁹ Attach Piggery layout map that shows the location of bait stations.

Appendix 3

Table 3.1 Chemical Rodenticides, Rodent Repellents and Attractants available in Australia¹⁰

Rodenticide Class	Active Ingredient	Brand Name	Registrant
1st generation	Coumatetralyl	Racumin 8 Rat & Mouse Blocks,	Bayer Cropsience P/L
1st generation	Coumatetralyl	Racumin 8 Tracking powder	Bayer Cropsience P/L
1st generation	Coumatetralyl	Racumin Rat & Mouse Blocks,	Bayer Cropsience P/L
1st generation	Coumatetralyl	Racumin Rat & Mouse Paste, Bayer advanced home rat and mouse killer contains Racumin,	Bayer Cropsience P/L
1st generation	Coumatetralyl	Ratex Mouse and Rat bait,	Parafarm P/L
1st generation	Coumatetralyl	Readi Rac Rat and Mouse Killer	David Gray & Co. P/L
1st generation	Diphacinone	Ramik Green Bait Bits Rodenticide	Hacco, Inc., a Neogen Company
1st generation	Warfarin	David Grays Rat N' Mouse Killer	David Gray & Co P/L
1st generation	Warfarin	Double strength Ratsak	Dulux Group (Australia) P/L
1st generation	Warfarin	Rat Kill	Stewarts Pest Control
1st generation	Warfarin	Rattex Gel	Amalgamated Pest Control P/L
1st generation	Warfarin	Rattex Tracking Powder	Amalgamated Pest Control P/L
1st generation	Warfarin	RCI Ratblitz	Ruth Consolodated Industries P/L
2nd generation	Brodifacoum	4farmers Rat And Mouse Bait Pellets	4 Farmers Australia P/L
2nd generation	Brodifacoum	All Weather PCT First Formula Blocks Rodenticide	PCT Holdings P/L
2nd generation	Brodifacoum	Brigand Rodenticide Blocks, Paste & Pellets	Pelgar International (Australia) P/L
2nd generation	Brodifacoum	Brodifacoum Manufacturing Concentrate	Helidon Tech P/L
2nd generation	Brodifacoum	Bromakil Blocks Grain Bait and Super Rat Drink	Rentokil Initial P/L
2nd generation	Brodifacoum	Ditrac All Weather Blox Rodenticide	Bell Laboratories Inc.
2nd generation	Brodifacoum	Ditrac Rodenticide	Bell Laboratories Inc.
2nd generation	Brodifacoum	Farmalinx Rodi Pellets	Farmalinx P/L
2nd generation	Brodifacoum	Farmalinx Rodi Wax Blocks	Farmalinx P/L
2nd generation	Brodifacoum	Farmoz Rodex B Rat Blocks	Adama Australia P/L
2nd generation	Brodifacoum	Farmoz Rodex B Rodenticide Pellets	Adama Australia P/L
2nd generation	Brodifacoum	Fast Action Ratsak Throwpacks Kills Rats & Mice	Dulux Group (Australia) P/L

¹⁰ Rodenticides marked with an * can only be used under the directives of their associated APVMA emergency permit



Rodenticide Class	Active Ingredient	Brand Name	Registrant
2nd generation	Brodifacoum	Fast Action Ratsak Waxblocks	Dulux Group (Australia) P/L
2nd generation	Brodifacoum	Fast Action Ratsak Waxblocks Kills Rats & Mice	Dulux Group (Australia) P/L
2nd generation	Brodifacoum	Imtrade Top Cat Rodenticide Wax Blocks	Imtrade Australia P/L
2nd generation	Brodifacoum	Klerat Xt Pro Rodenticide Wax Blocks	Syngenta Australia P/L
2nd generation	Brodifacoum	Mortein Mice Kill Professional	Reckitt Benckiser (Australia) P/L
2nd generation	Brodifacoum	Mortein Rat Kill Professional	Reckitt Benckiser (Australia) P/L
2nd generation	Brodifacoum	Mortein Rat Kill With Flea Eliminator	Reckitt Benckiser (Australia) P/L
2nd generation	Brodifacoum	Oztec Ratal Rodenticide Pellets	Oztec Rural P/L
2nd generation	Brodifacoum	Pest Defence Rat & Mouse Block Bait	ZAPI S.P.A.
2nd generation	Brodifacoum	Pest Defence Rat & Mouse Soft Bait	ZAPI S.P.A.
2nd generation	Brodifacoum	Pestmaster Mouse & Rat Bait	ZAPI S.P.A.
2nd generation	Brodifacoum	Pestmaster Rat & Mouse Killer Wax Blocks	ZAPI S.P.A.
2nd generation	Brodifacoum	Protect-Us Stealth Block Rat & Mouse Bait	ZAPI S.P.A.
2nd generation	Brodifacoum	Protect-Us Verminate Soft Bait Rodenticide	ZAPI S.P.A.
2nd generation	Brodifacoum	Ratal B Rat Blocks	Oztec Rural P/L
2nd generation	Brodifacoum	Raticide Mouse And Rat Bait	Parafarm P/L
2nd generation	Brodifacoum	Ratsak Professional All Weather Wax Blocks	Dulux Group (Australia) P/L
2nd generation	Brodifacoum	Ratsak Professional Pellets	Dulux Group (Australia) P/L
2nd generation	Brodifacoum	Ratshot Final Kill Paste Rodenticide	Freezone Public Health P/L
2nd generation	Brodifacoum	Ratshot One Shot Rodenticide Pellets	Freezone Public Health P/L
2nd generation	Brodifacoum	Ratshot Rapidkill Rodenticide Blocks	Freezone Public Health P/L
2nd generation	Brodifacoum	Rentokil Brodifacoum Paste	Rentokil Initial P/L
2nd generation	Brodifacoum	Rodenthor Block Rodenticide	ZAPI S.P.A.
2nd generation	Brodifacoum	Rodenthor Soft Bait Rodenticide	ZAPI S.P.A.
2nd generation	Brodifacoum	Sirdar Rat & Mouse Killer	Home Timber & Hardware Group P/L
2nd generation	Brodifacoum	Surefire All Weather Blocks Rodenticide	PCT Holdings P/L
2nd generation	Brodifacoum	Surefire Pellets Rodenticide	PCT Holdings P/L
2nd generation	Brodifacoum	Talon Rat & Mouse Killer	Syngenta Australia P/L
2nd generation	Brodifacoum	Talon Rat & Mouse Killer Damp Or Dry Areas	Syngenta Australia P/L
2nd generation	Brodifacoum	Talon Rat & Mouse Killer Ezy Throw	Syngenta Australia P/L

Rodenticide Class	Active Ingredient	Brand Name	Registrant
2nd generation	Brodifacoum	Talon Rodenticide Pellets	Syngenta Australia P/L
2nd generation	Brodifacoum	Talon Rodenticide Wax Blocks	Syngenta Australia P/L
2nd generation	Brodifacoum	Talon XT Pro Rodenticide Wax Blocks	Syngenta Australia P/L
2nd generation	Brodifacoum	The Big Cheese Ultra Power Fast Action Bait Blocks & Packs	Pelgar International (Australia) P/L
2nd generation	Brodifacoum	Tomcat II All Weather Blox Rodenticide	Bell Laboratories Inc.
2nd generation	Brodifacoum	Tomcat II Rodenticide	Bell Laboratories Inc.
2nd generation	Brodifacoum	X-Verminator Single Feed Lethal Dose Rodent Blocks	Animal Control Products Ltd
2nd generation	Brodifacoum	X-Verminator Single Feed, Lethal Dose Rodent Pellets	Animal Control Products Ltd
2nd generation	Bromadiolone	Bromadiolone Manufacturing Concentrate	Liphatech S.A.S.
2nd generation	Bromadiolone	Contra Blox	Bell Laboratories Inc.
2nd generation	Bromadiolone	Contra Rat And Mouse Bait	Bell Laboratories Inc.
2nd generation	Bromadiolone	Contra Rodenticide	Bell Laboratories Inc.
2nd generation	Bromadiolone	Generation Green Rodenticide Blocks & Pellets	Liphatech S.A.S.
2nd generation	Bromadiolone	Imtrade Alley Cat Rodenticide Wax Blocks	Imtrade Australia P/L
2nd generation	Bromadiolone	Klerat Xt Pro Rodenticide Wax Blocks	Syngenta Australia P/L
2nd generation	Bromadiolone	Maki Block & Pellets Rodenticide	Liphatech S.A.S.
2nd generation	Bromadiolone	Mouseoff Bromadiolone Rodent Bait	Animal Control Technologies (Australia) P/L
2nd generation	Bromadiolone	Muskil Dual Active Rodenticide Blocks With Fluo-Np Technology (Difenacoum as well)	ZAPI S.P.A.
2nd generation	Bromadiolone	Protect-Us Verminate Soft Bait Rodenticide	ZAPI S.P.A.
2nd generation	Bromadiolone	Protect-Us Verminate Soft Bait Rodenticide	ZAPI S.P.A.
2nd generation	Bromadiolone	Rat Stop Grain Bait	Oztec Rural P/L
2nd generation	Bromadiolone	Rentokil Bromakil Grain Bait For Rats And Mice	Rentokil Initial P/L
2nd generation	Bromadiolone	Rentokil Bromakil Kills Rats And Mice!	Rentokil Initial P/L
2nd generation	Bromadiolone	Rentokil Bromakil Super Rat Drink	Rentokil Initial P/L
2nd generation	Bromadiolone	Rentokil Bromakil-P Pellet and Block Bait For Rats And Mice	Rentokil Initial P/L
2nd generation	Bromadiolone	Rentokil Bromard	Rentokil Initial P/L
2nd generation	Bromadiolone	Rodemise Rodent Block	Animal Control Technologies (Australia) P/L
2nd generation	Bromadiolone	Rodemise Super Bromadiolone Rodent Block	Animal Control Technologies (Australia) P/L
2nd generation	Bromadiolone	Rodenthor Soft Bait Rodenticide	ZAPI S.P.A.
2nd generation	Bromadiolone	Surefire Broma Grain Bait Rodenticide	PCT Holdings P/L



Rodenticide Class	Active Ingredient	Brand Name	Registrant
2nd generation	Bromadiolone	Surefire Broma Pellets & Blocks Rodenticide	PCT Holdings P/L
2nd generation	Bromadiolone	Talon Xt Pro Rodenticide Wax Blocks	Syngenta Australia P/L
2nd generation	Bromadiolone	Tomcat All-Weather Blox	Bell Laboratories Inc.
2nd generation	Bromadiolone	Tomcat Rat And Mouse Bait	Bell Laboratories Inc.
2nd generation	Difenacoum	Atlas Mouse Killer	Pelgar International (Australia) P/L
2nd generation	Difenacoum	Cougar Rodenticide Wax Blocks and Rodenticide Paste Sachets	Pelgar International (Australia) P/L
2nd generation	Difenacoum	Effect Rodent Soft Bait	Unichem D.O.O.
2nd generation	Difenacoum	Ratsak Wax Blocks	Dulux Group (Australia) P/L
2nd generation	Difenacoum	Ratshot Rodenticide Blocks and Rat & Mouse Paste	Freezone Public Health P/L
2nd generation	Difenacoum	Ratshot-G Rodenticide Grain Bait	Freezone Public Health P/L
2nd generation	Difenacoum	Roban Rodenticide Blocks, Pellets, Rodenticide Paste & Rat and Mouse Killer Paste	Pelgar International (Australia) P/L
2nd generation	Difenacoum	Rodemise Difenacoum Rodent Bait Blocks	Animal Control Technologies (Australia) P/L
2nd generation	Difenacoum	Sorex Pro Rodenticide Paste, Gel, Pellets and Blocks	BASF Australia Ltd.
2nd generation	Difenacoum	Surefire "Difenate" All Weather Blocks	PCT Holdings P/L
2nd generation	Difenacoum	The Big Cheese Rat & Mouse bait Killer	Pelgar International (Australia) P/L
2nd generation	Difenacoum	Time's Up All-Weather Block Bait	Pelgar International (Australia) P/L
2nd generation	Difenacoum	Time's Up Rat & Mouse Killer Ready to use bait packs	Pelgar International (Australia) P/L
2nd generation	Difethialone	Generation Block Single Feed Rodenticide	Liphatech S.A.S.
2nd generation	Difethialone	Generation Blue Max Block Single Feed Rodenticide	Liphatech S.A.S.
2nd generation	Difethialone	Generation Blue Soft Bait, Pellets and Blocks	Liphatech S.A.S.
2nd generation	Difethialone	Generation Firststrike Single Feed Rodenticide	Liphatech S.A.S.
2nd generation	Difethialone	Generation Pellet Single Feed Rodenticide	Liphatech S.A.S.
2nd generation	Difethialone	Retokil Advanced Kil Blocks	Rentokil Initial P/L
2nd generation	Difethialone	Rodilon Professional Rodenticide	Bayer Cropscience P/L
2nd generation	Flocoumafen	Storm Secure Wax Block	Agnova Technologies P/L
Vitamin D3	Vitamin D3	Rampage	Bell Laboratories Inc.
Vitamin D3	Vitamin D3	Selontra*	BASF Australia Ltd.

Table 3.2 Rodent Deterrents

Active Ingredient	Brand Name	Distributor
Food grade Ingredients, non-toxic	Protect-us™ Rodent attractant	Protect-us P/L
Food grade Ingredients, non-toxic	The Big Cheese Mouse & Rat attractant for traps	Pelgar International (Australia) P/L
Non-toxic	Tomcat Mouse attractant Gel	Barmac P/L, a division of Amgrow P/L

Table 3.3 Rodent Attractants

Active Ingredient	Brand Name	Distributor
Garlic oil/white pepper	Rodenthor Rodent Repellent	Ensystem Australasia P/L

Appendix 4b

Table 4.1 Rodent/Pest Control Record – Completed Template Example¹³

Date	Shed /Area ¹⁴ Treated	Bait station No's	Pest	Treatment (Bait)	Quantity of bait ¹⁵ (gms or No. of blocks)	Comments	Name & Signature of staff member responsible for baiting
5/10/15	Dry Sow I	1-5,7,11-12, 14-18	Rat	Rampage Blox	5 blocks	Activity seems to be increasing. Need to start checking every 3 days	P. Mitchell <i>P. Mitchell</i>
5/10/15	Dry Sow I	6,8,10-13	Rat	Rampage Blox	4 blocks	Activity seems to be increasing. Need to start checking every 3 days	P. Mitchell <i>P. Mitchell</i>

¹³ Adapted from www.pestcontrol.basf.co.uk/agroportal/pc_uk/media/migrated/rural_pest_control/leaflets_1/Baiting_Record_Book2.pdf

¹⁴ Attach Piggery layout map that shows the location of bait stations.

¹⁵ Quantity of bait unless specified is per station in specified shed/area treated i.e. Farrowing I, Feed Shed, Smoko hut etc.,



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