FARM OFFICE COPY

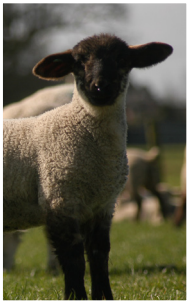
EFFECTIVE CONTROL OF RODENT PESTS ON FARMS






Photo: Richard Mills



Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

THINK WILDLIFE
Campaign for Responsible Rodenticide Use

Teagasc
Agriculture and Food Development Authority

Effective Control of Rodent Pests on Farms

INTRODUCTION

This booklet describes how rodent control should be carried out on farms in an effective, responsible and environmentally friendly manner.

Rodent control is essential to ensure food hygiene and for the protection of human and animal health.

A new approach to rodent control is needed which includes a range of actions, of which rodenticides may be one, and this approach is described in this booklet.

The rodenticides in use today have a variety of brand names and most contain anticoagulant substances. Individual rodenticide product labels provide details of the specific conditions under which each product must be used. These conditions reflect the detailed assessment conducted by the Regulatory Authorities. There is a legal obligation to follow the label instructions.

RODENTS - ECONOMICS AND HEALTH

Rodent pests, whether Norway (Brown) Rat or House Mouse, if not controlled, cause serious economic losses on farms through the consumption, contamination and spoilage of food and feed, spread of pathogens which are damaging to human and animal health, damage to buildings and equipment, loss of poultry and game birds, loss of quality assurance accreditation (Bord Bia, IGAS, etc.) and damage to reputation.

Best practice rodent control, as specified in this booklet and in the CRRU code, is a condition of the GLAS scheme and is an important element of GLAS training.

Rodents are prolific breeders. A female House Mouse can produce up to 40 young in a year, while a female Brown Rat can produce up to 80 young in a year. Mice become sexually mature at 5 to 8 weeks while Rats become sexually mature at 3 to 5 months. It has been estimated that the total crop losses caused by rodents each year could feed 200 million people - equivalent to almost 40% of the population of the EU. Rodents also carry a range of parasites and pathogens which can affect humans and animals including Weil's disease, Salmonellosis, Brucellosis. It is thought that 25% of farm fires are caused by rodents gnawing through electrical wiring.

CURRENT PRACTICES

It is a false assumption that using tamper-resistant bait boxes, particularly on a permanent basis does not affect wildlife. Some of the contamination of Irish wildlife is likely to be the result of non-target small animals e.g. Wood Mouse and Bank Vole, small birds, slugs and snails entering bait boxes and feeding on bait. Equally, many predators in Ireland such as Barn Owls and Red Kites feed, to a large extent, on target rodents and therefore may be exposed to rodenticides through feeding on both target and non-target small animals.

Many farmers and other rodent control practitioners may consider rodenticides as their primary, and only means of control. However, rodenticides must only be used as a temporary solution and only after other procedures have been fully considered and implemented, and where farms and farm buildings have been made less conducive to rodent infestation.

A farm rodent control strategy must consider the concept of "risk hierarchy" whereby the least severe methods, in terms of risk to humans and wildlife, must always be considered first. This booklet will help to plan and implement effective rodent control and result in a reduced risk of accidental exposure of humans and non-target animals.

- If using rodenticides, information on the product label must be adhered to, which includes - application details, manner and area of use, details of required restrictions, resistance information, and risk and safety information.
- It is illegal to bait sites on a permanent basis unless justified by means of a documented risk assessment - measures to make sites less amenable to infestation must be implemented once rodents have been controlled.
- Farmers must become better acquainted with the risks inherent with the use of rodenticides, especially when they are applied outdoors, and must implement all appropriate risk mitigation measures.

IMPLEMENTING A RODENT CONTROL STRATEGY

It is best practice to adopt an Integrated Pest Management (IPM) approach to rodent pest control. All available control options should be considered (as detailed on pages 6-8). The use of rodenticides cannot be justified unless these control options are addressed.

Relying on rodenticides alone does not guarantee the successful elimination of rodents. It is important that, following restriction of food and water to rodents and the application of measures to reduce rodent numbers, consideration be given to ways of improving site management. This should provide effective long-term control of rodent infestations and will rarely have significant impacts on non-target animals. It is important to concentrate particularly on improving hygiene and proofing, as well as maintenance and repair of buildings.

REMEMBER THAT:

- A rat can fit through a gap the width of a thumb (13 mm)!
- A mouse can fit through a gap the width of a pencil (6 mm)!

All necessary operations that make sites less attractive to rodents should be implemented

PROOFING AND EXCLUSION

Although they may be costly and require frequent maintenance, measures to prevent the entry of rodents into buildings (proofing) provide a long-term solution to rodent problems and are usually without adverse impacts to non-target wildlife. Proofing also needs to take account of the presence of birds and bats and to avoid interference with, or obstruction of, their nests and roosts. Most wild birds, as well as their nests and eggs, are protected under relevant legislation (http://www.npws.ie/legislation).

ENVIRONMENTAL CLEAN UP

In order to deter rodent infestations, farms should, as far as is practical, be regularly cleared of all debris, rubbish, old machinery and equipment, unwanted stores of straw and hay, etc. Vegetation in the vicinity of buildings should only be removed having considered its potential to harbour rodents and its value as a habitat for wildlife, including pollinators and rodent predators. Required vegetation or scrub clearance should be carried out outside the nesting season (March to August). It is desirable to provide an open area of 20 metres or so around buildings, so that harbourage is removed and predators can take rodents.

All methods used for the removal of rodents, including the use of lethal or non-lethal traps and the application of rodenticide baits, have the potential to harm non-target animals and the environment. Although these risks can be mitigated by following best practice, they cannot be entirely avoided. Therefore, the appropriate strategy when choosing methods for the control of rodents is to employ methods that have the least risk for non-target wildlife but which will be effective in the control of target rodents. This is the concept of "risk hierarchy".

WILDLIFE SPECIES AT RISK OF SECONDARY POISONING

The methods of managing our farmland impact on the wider ecosystem. Healthy environments have a rich variety of habitats that support and maintain biodiversity. Predators sit at the top of the food chain and are sentinels of the health of our environment. They play an essential role in maintaining biodiversity and the balance of nature. Birds of prey and owls are top predators, as are mammals such as Pine Marten and Stoat. Rats and mice form a major part of the diet of these predatory species.

Rodent predators can be exposed to rodenticides by feeding on rodents that have died of rodenticides poisoning or by catching and feeding on live rodents which have these toxins in their systems. Recent Irish studies provided evidence of rodenticides in the bodies of Barn Owls and Red Kites, likely acquired through consumption of prey. The contamination of such species has been confirmed through analysis of carcasses as part of ongoing statutory monitoring and is a matter of serious concern. Although species which feed on rodents are considered to be the most vulnerable to secondary poisoning, other species can also be contaminated indicating that these toxins are entering food chains through other routes.

Images and information on some of the birds and animals that are at risk of secondary poisoning with rodenticides are provided on the following pages!

Barn Owl *(Scréachóg reilige)*

Photo: Richard Mills

Barn Owls are scarce in Ireland – it is estimated that their population declined by over 50% in the last 25 years, but are still present in every county. Although rare, they remain one of our best known birds, helped by the fact that in generations past they were valued for catching rodents around farm yards. The Irish name for Barn Owl 'Scréachóg reilige' (graveyard screecher) gives an indication of the nesting sites they use – churches, derelict buildings, ruined castles, and farm buildings. They are efficient predators, adapted to locate and catch small mammal prey. A pair can take up to 25 rodents in a single night during the breeding season. Their slow 'moth-like' flight is almost silent, which helps to conceal their presence.

Concerns: *Barn Owls feed predominantly on rodents and are therefore vulnerable to exposure to rodenticides in prey that have eaten rodenticides. Research indicates that the majority of Barn Owls are exposed to rodenticides.*

Red Kite *(Préachán ceirteach)*

Photo: Tony Cross

Red Kites were widespread until the end of the 18th century. Easily recognisable due to their striking red colouration and distinctive forked red tail when seen in flight, they are magnificent fliers capable of acrobatic flight and soaring for long periods. They were re-introduced to Ireland between 2007 and 2011 by the Golden Eagle Trust in partnership with the Welsh Kite Trust when 160 young kites were released in Co. Wicklow and Co. Dublin and have been breeding since 2009. There were 80 kites also reintroduced into Co. Down between 2008 and 2010. They feed mostly on rodents, rabbits and crows, and also on carrion including dead rats. Several Red Kite carcases have tested positive for rodenticides since their reintroduction.

Concerns: *Red Kites are at risk of secondary poisoning from rodenticides as they include rats and other small mammals in their diet and will hunt live prey as well as scavenge dead animals and may be exposed through both routes.*

Pine Marten *(Cat Crainn)*

Photo: Noel Marry

Once widespread throughout Ireland, by the 20th century only a few fragmented populations remained in the west. More recently the Pine Marten population is recovering. An adult Pine Marten is about the size of a domestic cat, hence the Irish name 'Cat crainn', and has a long tail that can be half the length of its body. They have dark brown fur with a distinguishing creamy yellow throat patch. Pine Martens are arboreal, generally inhabiting forests but can be found in a range of farmland habitats. They are agile climbers, and are omnivorous taking both plants and animals in their diet. In Ireland, they exploit a variety of resources including berries, fruits, small mammals, invertebrates and birds.

Concerns: *Pine Martens have a varied diet but are at risk to exposure to rodenticides through the live prey they take, in particular small mammals.*

Buzzard *(Clamhán)*

Photo: Shay Connolly

Buzzards are present throughout Ireland and can be observed soaring over rich farmland in lowland areas, particularly in parts of the east and south. They are a medium sized bird of prey with broad wings and a compact body. Buzzards became extinct in Ireland in the early part of the 20th century but re-colonised naturally in the 1970's. They hunt small mammals such as rats and mice as well as rabbits, young Rooks, Magpies and Hooded Crows. They also take carrion, putting them at risk of feeding on rodents which have died as a consequence of rodenticide use.

Concerns: *Buzzards are considered to be particularly at risk of secondary poisoning from rodenticides as they include rats and other small mammals in their diet and will hunt live prey and scavenge dead animals and may be exposed through both routes.*

Long-eared Owl *(Ceann cait)*

Photo: Breffni Martin

Although rarely seen, this is the most common owl in Ireland. It is more often heard, particularly when there are young which call from the nest site throughout the night during the nesting season. Their call has been described as being like a squeaky gate. The 'ear tufts' from which their name derives are distinctive, as are their orange eyes. They nest in the disused nests of the Hooded (grey) Crow or Magpie in shelter belts, forests, hedgerows or isolated trees and hunt the surrounding countryside for small mammals including Mice, Rats, Shrews, Bank Voles where available and also small birds. Like Barn Owls, they are vulnerable to secondary poisoning from rodenticides.

Concerns: *Long–eared Owls have a similar diet to Barn Owls and do not typically scavenge. They are susceptible to secondary poisoning from catching and feeding on a range of small mammal prey.*

Kestrel *(Pocaire gaoithe)*

Photo: Clive Timmons

The Kestrel is one of our most common birds of prey. It has a distinctive hunting method - it hovers in mid-air, hanging almost motionless, scanning the ground for prey. It mainly takes small mammals – Rats, Mice, Shrews, Bank Voles as well as Frogs, Lizards and small birds. It occupies a wide range of farmland habitats. It nests in trees, buildings, quarries and coastal cliffs. Recent survey work has shown a decline in the Irish Kestrel population. Although the extent of secondary poisoning of Kestrels in Ireland is not known, research in the UK has confirmed that the majority of the Kestrel population there are exposed.

Concerns: *Kestrels have a varied diet but small mammals are generally the most important prey items and through this route they are likely to be exposed to rodenticides.*

Irish Stoat *(Easóg)*

Photo: Dermot Breen

The Stoat, our smallest carnivore, is often mistakenly referred to as a Weasel to which it is closely related but which is absent from Ireland. The Irish Stoat, a native sub-species, is smaller with darker fur than Stoats elsewhere in Europe. They have reddish brown fur with a white underbelly and long, slender bodies about one foot in length with short legs and a tail with a distinctive black tip. They are widespread throughout Ireland and use a range of habitats particularly stone walls, hedgerows, ditches, open woodland and rocky scrub covered areas. They are a formidable predator, with excellent eye-sight, smell and hearing, and actively stalk and chase prey. They can mesmerise other creatures with outlandish behaviour and will hunt animals five times their own weight. Their diet includes rabbits, rodents, birds, eggs, and invertebrates, but they will also eat fruit and berries depending on availability.

Concerns: *Stoats have a varied diet but are at risk to exposure to rodenticides through the live prey they take, in particular small mammals.*

Peregrine Falcon *(Fabhcún gorm)*

Photo: Neil O'Reilly

One of Ireland's most magnificent birds, after severe declines the Peregrine Falcon has now returned to much of its former range and can be found throughout the country. It nests on cliff faces, crags, within quarries and even occasionally on building ledges and church steeples including those in city centres. In winter Peregrines can be found at estuaries, marshes and other expanses of open land.

Concerns: *Although Peregrine Falcons specialise on birds and do not typically feed on small mammals, they can still be vulnerable to secondary poisoning when rodenticides enter the lower levels of the food chain (e.g.slugs and snails), and contaminate birds on which they feed.*

KEY POINTS IN RODENT INTEGRATED PEST MANAGEMENT

Why?

Rodents must be controlled because of risks to human and animal health; contamination and spoiling of food and feed; structural damage; Quality Assurance Scheme compliance; and loss of reputation etc.

How?

Integrated Pest Management (IPM)

- Proofing buildings
- Restricting food and water
- Surveying and mapping the farm,
- Controlling any existing rodent populations.
- Taking measures to reduce likelihood of re-infestation.
- Reducing the chances of re-infestation by on going monitoring

Exclusion:

- Repair building or drain defects (broken pipes, defective sewer chamber covers, bad brick work, damaged cladding).
- Seal gaps under, and at sides of, entrance doors and windows. BUT, if infestation is present, avoid extensive disturbance until control is achieved.
- When proofing, take care not to interfere with or block access to nesting birds and bat roosts.

Restriction:

Deny access to food, water and harbourage.

- Ensure that all available sources of food and water for rodents are removed or contained.

Survey & Map:

- Inspect and record all further areas for exclusion and restriction.
- Inspect and record the type, level and extent of rodent infestation.
- If infestation is present do not disturb the site until control has been achieved.
- Assess and record degree of public access, and presence of children.
- Assess and record presence / potential presence of non-target animals - pets, farm livestock, and wildlife. The presence of certain wildlife that use the farm may not always be obvious e.g. nocturnal species such as Barn Owls.
- Record evidence of poor housekeeping and hygiene, alternative food sources and water - all of which should be noted on the site plan.
- Assess and record risks likely to arise for operators, employees and others by treatment and arrangements to minimise risks arising.
- Assess and record risks likely to arise for non-target species that may be present in or frequent the farm, and steps required to minimize those risks.

DESTRUCTION METHODS

Biological Controls:

Farm cats and dogs are more effective in preventing the re-establishment of a rodent pest infestation than in eliminating an infestation as they are better able to catch and kill an invading rodent that does not know any escape routes. Cats are effective predators of mice, but usually will not attack an adult rat.

Trapping:

Lethal and Non-lethal traps must be used in accordance with relevant legislation and the CRRU Best Practice Requirements.

Lethal Traps:

A risk assessment must be completed prior to use of lethal traps. Based on the outcome of the risk assessment, break-back traps must be placed in areas where they cannot be accidentally triggered, and where the general public do not have access.

Break-back trap locations should be recorded on site plans/maps. Baited traps must contain a suitable attractant (e.g. chocolate, peanut butter or other attractant) as the use of toxic bait in traps presents unacceptable environmental risks.

Non-lethal Traps:

Non-target animals caught in traps must be released unharmed back into the environment. Target rodents, Grey Squirrels and Mink must be dispatched humanely. Dispose of target animal

carcasses with site domestic waste, in the site's normal non-hazardous waste or by burying to a depth of at least 50 cm and away from sensitive areas, water courses etc.

Key Considerations for Use of Lethal and Non-lethal Rodent Traps in the open air:

- Traps should only be set after consulting the manufacturer's instructions regarding pest species and trap location. If in any doubt the trap should not be set.
- Every effort should be made to avoid trapping non-target species. Farmers and others who use lethal break-back traps must be able to recognise the signs and evidence of the presence of rodent pest activity. In the absence of clear evidence of the species being present, the need for trapping should be reviewed and an alternative, and more appropriate, control method should be considered.
- The entrance of trap tunnels should be restricted (e.g. with sticks) to discourage entry of non-target species.
- Traps, or the containers / vessels in which they are placed, should be firmly anchored in the treatment area.
- Traps should be checked at daily intervals and more often where, on the basis of an environmental risk assessment, a need for more frequent checking is identified. Traps should not be set in open or accessible areas where members of the public, animals and pets or non-target wildlife can gain easy access to them.
- Suitable Personal Protective Clothing and Equipment (PPE) must be worn when dealing with traps and rodent carcases to prevent the transmission of rodent borne disease.

USING RODENTICIDES

Choice of Rodenticide:

- Carefully consider the choice of formulation.
- Know what active substance it contains.
- Check the label and follow instructions carefully – a legal requirement.

Non-anticoagulants

- Rodenticides containing alphachloralose may only be used indoors for the control of House Mice - correct usage presents minimal risk to humans and non-target animals.

The use of alphachloralose is illegal except for the control of Mice indoors

Anticoagulants

- First generation anticoagulant rodenticides, where available, include the compounds, warfarin, chlorophacinone and coumatetralyl, are less toxic and less persistent in animal tissues than second generation compounds, but larger quantities over longer periods with more frequent checking are required to achieve control.
- Second generation anticoagulants, brodifacoum, bromadiolone, difethialone, difenacoum and flocoumafen are more toxic and are persistent in the environment.

Where there is evidence of rodent resistance to these compounds, they should not be used, as -

- ***they will not control rodent populations***
- ***they pose an unacceptable risk to the environment/non - target species***

The use of second-generation products presents the greatest risk to wildlife. They should be used with great care and only when rodent resistance to first generation products has been identified.

Choice of bait formulation - (meal, cut or whole grain, pellets, wax blocks, contact gels and foam): -

- Cut or wholegrain baits may be more palatable to rodents than wax blocks, but wax blocks may be better in adverse conditions. For baiting burrows, grain bait is less likely to be expelled from the burrow.

Critical Points in the Use of Rodenticides

- Only use a rodenticide product that is officially authorised for use by the Regulatory Authorities and carries an official authorization number (i.e. IE/BPA No. 7xxxx).

- Carefully follow the instructions for use as printed on the product label.
- Ensure that bait is adequately protected from children and from non-target animals – tamper resistant bait boxes can be made or can be purchased.
- Where bait is placed in rat burrows, back-fill the entrance with a sod or cover with a rock.
- Baits used indoors should be placed on trays to facilitate recovery at the end of treatment.
- Bait stations used should be appropriate to the prevailing circumstances. They should provide access to the bait by rodents, while reducing risks of non-target access and interference by unauthorised persons. They should protect the bait from contamination by dust or rain. Their design, construction and placement should be such that interference is minimised.
- Baits placed outdoors should be at locations where rodent activity has been identified.
- The quantities of bait used must be recorded.
- Use enough baiting points – a record and map of all baiting points must be maintained.
- Regular inspections are required and bait should be replenished in accordance with the label instructions. Never use anticoagulant rodenticides as permanent baits. Anticoagulant bait should provide control within 35 days. Should activity continue beyond this time, the likely cause should be determined and a new approach should be taken.
- During inspections, search for and remove dead and dying rodents, and dispose of them with the farm's domestic waste, normal non-hazardous waste or by deep burying (> 50 cm) away from sensitive areas, water courses etc.

REVIEW, CLEAN-UP & MONITOR

Once an Infestation is Controlled:

- Remove bait and dispose of it according to the label instructions – infestations should be controlled in, at most, 35 days.
- Update records to signify that the infestation has been controlled and that, as far as reasonably practical, all steps have been taken to ensure that the farm or site is now free of rodenticide bait.
- Remove debris, rubbish, old machinery and equipment, unwanted straw/ hay.
- Improve housekeeping and hygiene and restrict access.
- Clear vegetation around buildings to provide an open area of 20 metres or so, to allow natural predators (e.g. farm cats, farm dogs, predatory birds and animals) take rodents – vegetation clearance should not be carried out during the nesting season (March to August);
- Initiate a monitoring programme to check for possible re-infestation using non-toxic bait and/or regular inspections.

Possible Re-infestation

If precautionary measures (e.g. proofing and hygiene) are rigorously implemented, re-infestations will be infrequent, limited in scale and easy to control with farm dogs and cats or by using traps.

FURTHER INFORMATION

The CRRU Ireland publication Best Practice Requirements for Rodent Control and Safe Use of Rodenticides is available for download at **WWW.CRRU.IE.**


Photo: Mike Brown

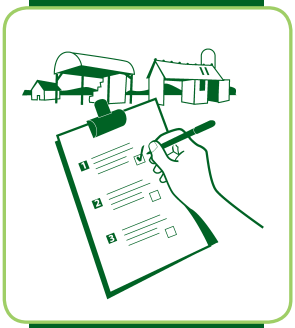
The CRRU Code

The rodenticide industry, acting as a whole, has recognised the need to address the concerns surrounding the responsible use of rodenticides and the need to ensure that rodenticides are used correctly and in ways that will minimise the exposure of wildlife. The industry has therefore initiated the Campaign for Responsible Rodenticide Use (CRRU).

Key to the campaign is a code of good practice for the responsible use of rodenticides in rural areas.

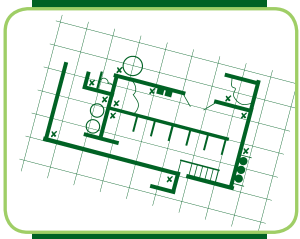
This stresses the need to adhere to the following good practice. It has adopted the logo 'Think Wildlife' to build recognition of the code and the overall campaign aims.

CRRU code is:



Always have a planned approach

- Before treatment begins, a thorough survey of the infested site is an essential key to success when using any rodenticide.
- Environmental changes which could be made to reduce the attractiveness of the site to rodents should be noted for implementing after the treatment. Usually this will involve rodent proofing and removing rubbish and weeds that provide harbourages and cover. However, the site should not be cleared before treatment since this will disturb the rodent population and make bait acceptance more difficult to achieve.
- Obvious food, such as spilled grain, should be removed as far as possible and any food sources covered.
- Rodenticide baits should only be used for as long as is necessary to achieve satisfactory control.
- In most cases, any anticoagulant bait should have achieved control within 35 days. Should activity continue beyond this time, the likely cause should be determined and documented. If bait continues to be consumed without effect, a more potent anticoagulant should be considered. If bait take is poor, relative to the apparent size of the infestation, consideration should be given to re-siting the bait points and possibly changing to another bait base, as well as making other environment changes.



Always record quantity of bait used and where it is placed

- A simple site plan or location list identifying areas of particular concern pertinent to the site should be drawn up and retained on file.
- A record of all bait points and the amount of bait laid should be maintained during the treatment. Activity should be noted at each bait point, including any missing or disturbed baits, as the treatment progresses.
- By carefully recording the sites of all bait points responsible users of rodenticides are able to return to these sites at the end of the treatment and remove uneaten bait so that it does not become available to wildlife.

Always use enough baiting points

- Users should follow the label instructions regarding the size and frequency of bait points and the advice given regarding the frequency and number of visits to the site.
- By using enough bait points the rodent control treatment will be conducted most efficiently and in the shortest possible time. This will restrict the duration of exposure of non-target animals to a minimum.

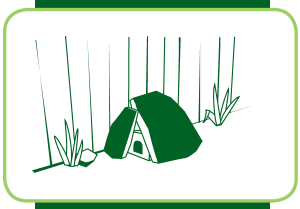
Always collect and dispose of rodent bodies

- The bodies of dead rodents may carry residues of rodenticides and, if eaten by predators or scavengers, may be a source of wildlife exposure to rodenticides.
- It is essential to carry out regular searches for rodent bodies, both during and after the treatment period. Bodies may be found for several days after rats have eaten the bait and rats may die up to 100 metres or more away from the baited site.
- Any rodent bodies should be removed from the site and disposed of safely using the methods recommended on the label.

Never leave bait exposed to non-target animals and birds

- Care should be taken to ensure that bait is sufficiently protected to avoid accidentally poisoning other mammals and birds. Natural materials should be used where possible.

- Bait stations should be appropriate to the prevailing circumstances. They should provide access to the bait by rodents, while reducing the risks of non-target access and interference by unauthorised persons. They should protect the bait from contamination by dust or rain. Their design, construction and placement should be such that interference is minimised.



Never fail to inspect bait regularly

- Where the risk assessment or treatment records show that multiple visits are required, then those should be made as frequently as is considered necessary. Daily inspection may be required in some circumstances.

- At each visit, baits should be replenished according to the product label and a thorough search made to ensure that bodies and any spilled bait are removed and disposed of safely. Records of such visits should be maintained.

Never leave bait down at the end of the treatment

- Bait left out at the end of a treatment is a potential source of contamination of wildlife.

- On completion of the treatment, records should be updated to signify that the infestation is controlled and that, as far as reasonably practical, all steps have been taken to ensure that the site is now free of rodenticide bait.

For further details on CRRU see:

www. thinkwildlife.org

info@thinkwildlife.org

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CRRU Ireland (www.crru.ie and www.thinkwildlife.org) was formed, at the request of the regulatory authorities, by companies that manufacture and distribute rodenticides in Ireland. Its aim is to promote the responsible use of rodenticides and has as its prime objective the avoidance of harm to wildlife.

This booklet was prepared by the Campaign for Responsible Use Ireland (CCRU Ireland) working with BirdWatch Ireland, the Federation of Agrochemical Retail Merchants (FARM), Emel Consulting, TEAGASC and the Department of Agriculture, Food and the Marine.

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