
Monitoring and Controlling Rodents Indoors; a Guide to the Non-Toxic Options

Introduction

There are many restrictions on the use of rodenticide baits within food manufacturing, storage and retail facilities. The retailer, manufacturer or third party standards that the site has to comply with are one of the principal drivers. Some of these standards prohibit the use of rodenticides in any internal area, some allow use in selected areas, and some allow use throughout the site. For example:

BRC Issue 8, clause 4.14.5

Toxic rodent baits shall not be used within production or storage areas where open product is present except when treating an active infestation. Where toxic baits are used these shall be secured.

Tesco Food Manufacturing Standard, clause 10.7

Toxic baits must not be used routinely in open product manufacturing and storage areas, unless in enclosed access panels. Loose/granular toxic baits must not be used in open product manufacturing and storage areas (e.g. poison grain). Gels or blocks must be used.

Marks and Spencer – Guidance for Pest Prevention

There should be no use of rodenticides in food preparation, production or packing areas unless an active infestation is being treated. All bait preparations should be retained within bait boxes unless in exceptional circumstances (e.g. box shy mice). Loose grain bait should not be used internally unless in secure wall cavities or voids where it is appropriate and safe to do so. Non-spill formulations should always be the first consideration.



The use of rodenticides must also take account of the environment in which they are used. For example, from 1 March 2018 it became compulsory for any rodenticide bait containing over 30 parts per million active ingredient to be labelled 'toxic to reproduction', to include the phrase 'may damage the unborn child', and to carry the label identifier shown left. A specific health and safety risk assessment may be necessary when such products are used where pregnant women are likely to be present; in retail or hospital environments for example.

Where rodenticide use is permitted, either on a permanent or temporary basis, then it is essential, from both a food safety and GMP perspective, that adequate control is maintained. Such controls would probably require the use of non-spill bait, within numbered and secured (tethered) tamper-resistant bait stations, which are dated or barcode-scanned as part of every routine inspection. Loose bait formulations would typically be limited to those sites where rat problems present a genuine risk and should be used only on a temporary basis. Controls on loose bait use would normally be much tighter than those for non-spill baits.

The frequency of inspection of rodenticide baits would be driven by the label requirements but should certainly be at least eight times per annum. Should activity be detected then follow up inspections must take place, at least weekly.

Where rodenticide use is not permitted for routine monitoring purposes then monitoring must be done using a non-toxic or physical option. The remainder of this guide is intended to help those responsible for managing the pest control contract understand what alternative options are available. ***They may then enter into informed discussion with their pest control contractor about the most appropriate approach for their own site.***




It is important to emphasise that physical control options will rarely eradicate an established rodent infestation. These systems are generally more suitable for use against occasional intruders, perhaps those entering from outside or with incoming goods. Established infestations that are resident within the fabric of the building can rarely be eradicated using only a non-toxic approach. In such situations rodenticides will normally be required to eliminate the problem, before the move to a non-toxic monitoring programme can be made.

It is also important to emphasise that an effective Integrated Pest Management (IPM) programme will be built around a robust hygiene, housekeeping and proofing regime, to prevent or reduce rodent attraction and harbourage.

Non-toxic monitoring and trapping options

i) Non-toxic feeding points

These have traditionally consisted of a food-based attractant and are usually of identical formulation to a rodenticide bait, but without the active ingredient. The lack of any warning dye (typically blue, green or red) signifies that the product is non-toxic. There are several blocks, pastes and gels available, with a profusion of flavours. Some products include a component that fluoresces under UV light, so providing some ability to track rodent movement.

Curry flavour gel	Non-toxic blocks	Paste with UV marker
		

Although non-toxic feeding points might appear to provide a straightforward alternative to toxic baits when used for monitoring purpose, they do have several disadvantages:




- They require that the rodent feeds on them so, just as with a rodenticide bait, there may be problems with palatability.
- They are a food source, so they may actually attract rodents into a building or area, particularly if there is no other food source in the vicinity.
- They will not kill or capture the rodent.

It is our view within Acheta that non-toxic feeding points offer the least favourable alternative to a rodenticide bait for routine monitoring purposes. Furthermore, when used, because there is a risk of infestation developing between routine inspections, it is our recommendation that non-toxic monitor inspection be undertaken at least weekly.

ii) Synthetic lures

These products contain a synthetic attractant fused into a lure, which itself consists of some form of synthetic polymer. Some lures are designed to be used to enhance the attractiveness of a conventional mouse trap, whilst others are designed to attract and be gnawed by rodents, so providing a visual indicator of their presence. Unlike a non-toxic food bait, a synthetic lure is likely to remain attractive for an extended period, though to our knowledge no one has ever ascertained how long this might be. *It is also worth highlighting that products such as these do not have to undergo any form of testing to ascertain whether they do actually work!*

Irrespective of type, if genuine food sources are available then encouraging rodents to these synthetic alternatives is likely to be challenging.

Synthetic lure; for use on a trap	Nara Liquid; a synthetic water droplet for use on a trap	Synthetic block
		

iii) Trapping

Trapping can be divided into two broad categories:


a. Live-capture systems

The mouse (and these systems are almost invariably intended for use against mice) is trapped alive. If it remains alive at the time of inspection (many die quickly when trapped, through shock and heart failure) it should be humanely despatched by tipping it into a suitable bag and hitting it on the head.

The advantage of most live-capture traps over kill-traps is that they are generally multi-catch, so will continue to be active after they have caught an animal. However, a major disadvantage, certainly within Europe, is that for humaneness reasons it is necessary to inspect such devices at least once every 24 hours.

Mice, although *generally* naturally curious creatures, do seem to be more wary of traps, and we have come across examples of heavy infestations, where few were being caught in the live-capture traps.

A selection of the trap types available is shown below:

Ketch-All trap	Tin-Cat trap	Rat multi-catch trap
		

In our experience, the most effective of these is probably the Tin-Cat trap. With their clear perspex cover these traps may be used in conjunction with an electronic monitor, such as GreenTrapOnline (discussed later in this document), so eliminating the need for daily inspection.




The use of live capture rat traps, certainly in food production premises, is likely to be a rare occurrence. Encouraging such naturally cautious creatures into traps requires both skill and patience.

No mention of live-capture devices is complete without mention of glue-boards. These are undoubtedly a highly effective means of catching mice, and glue-boarding is a technique that it is important we retain. However, a UK industry code of practice requires that glue-boards be used for control purposes only, and as a **method of last resort**. They should be inspected at least once every 12 hours. Similar, or more demanding, restrictions exist throughout most of Europe.

It is our view that, although glue-boards may be widely deployed on a permanent basis in sites outside of Europe, even here they should really be considered a method of last resort and, even where such use is permitted, they should play no role in a permanent monitoring programme.

b. Kill-trapping systems

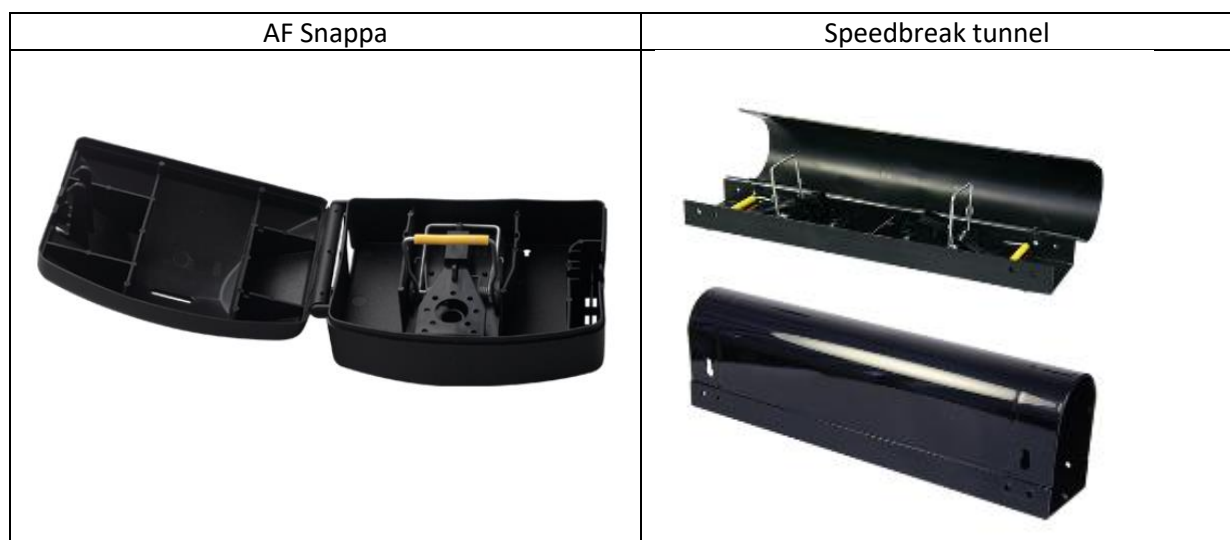
Kill-trapping systems tend to be a 'single-hit'; once they have caught an animal they will not catch another until they have been emptied and re-set. Most kill-trapping systems are based on break-back traps, an obvious 'one-hit' device. More high-tech systems are appearing however. For example, the GoodNature A24 trap incorporates a CO₂ canister, which fires a killing bolt into the skull of the animal, and then resets itself afterwards. The carcass drops to the ground, where it is intended that it be scavenged by other birds or mammals. Its application in our sector would be limited to rats and squirrels.

GoodNature A24	Snap-E	Trapper Mini Rex
		

Break-back traps may obviously be used as a standalone device, not contained within a box/bait station. Uncontained use does have several disadvantages however:

- They are, arguably, accidentally activated more easily
- Trapped rodents will be on display to any passer-by
- In the event the trap is not secured, there is a risk of relocation if a fatal activation is not achieved
- As the rodent is not 'guided' onto the trap the chance of a non-fatal activation is, perhaps, increased.

Numerous housings have appeared in recent years that are designed to contain break-back traps. Two of the most popular are shown below:



Even a housed trap is very vulnerable to accidental activation, so they do need to be inspected frequently; two-weekly should be regarded as the absolute maximum interval, certainly when they are used indoors. *However, because of the risk of fly-breeding and unpleasant odours associated with rodent carcasses, it is strongly suggested that weekly inspection be considered where such issues could present a public health or food safety hazard.*

Many of these devices can be inspected without being either picked up or opened; a yellow or blue bar on the trap, visible through a slot in the top of the housing, indicating whether it is active or sprung. However, periodic opening is advised to check trap function, and to ensure that dirt or spiders have not rendered the device unattractive to the target pest.

The 'Hidden Kill' trap opposite make a feature of the fully enclosed nature of the trap and the 'at a glance' activation indicator.





A battery-operated electric trap offers a slightly higher-tech trapping option. Mice are killed when they bridge the electrical contacts, with a red LED warning light on top of the device signalling that it has been activated. The batteries are reported to be good for up to 50 kills, though one would hope that a food manufacturing site would not need to put that claim to the test! Although accidental activation should not be an issue with these traps, they should still be inspected at the same frequency as simple break-back traps; at least fortnightly, ideally weekly. There should ideally be a protocol covering testing and replacement of batteries to ensure they remain effective at all times.

A more novel method of mouse control, and one that is exclusive to Rentokil, is the RADAR unit. When a mouse enters through one of the two entrances, the rodent breaks two consecutive infra-red beams. This trips a circuit and closes both entrances. Release of carbon dioxide gas from a cylinder inside the sealed chamber results in rapid death, and a warning light illuminates to indicate capture. The gas cylinder requires replacing for re-activation of the trap. Given the reliance on battery power, the units need to be function-tested regularly.



The RADAR device is no more than a single-kill mouse trap, albeit a very sophisticated one. Similar to all other live and kill trapping devices we recommend that RADAR devices be inspected at least weekly. However, if this device is connected to Rentokil's remote monitoring system (PestConnect), the need to check weekly may be reviewed.

To bait or not to bait a trap?

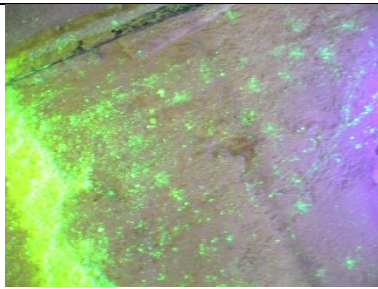
This is a question that has raged for many years, and probably always will. To our knowledge there is no scientific evidence to support increased capture rates on traps that incorporate a food attractant or synthetic lure. Mice are inquisitive creatures and will frequently explore, and get caught by, un-baited traps. In the food industry un-baited traps, or use of a synthetic lure, is probably the best approach, with a true food attractant introduced only if problems are being experienced. When a real food is used the site's allergen policy will need to be complied with. Chocolate or a raisin might be the first choice. If permitted, peanut butter can be highly attractive. Occasionally, fresh fruit, tinned tuna or meat might be used, though these obviously have a very short period when they would remain palatable.

iv) Tracking dust and tracking gel

If used appropriately, these products can help identify very low levels of mouse activity and can also help identify rodent harbourage and nesting sites.

Fluorescent dust **MUST** be applied sparingly (ideally on a substrate material such heavy gauge paper or cardboard to aid removal) on suspected rodent runs. Tracking gel has the advantage of being more 'containable' and may also be applied to vertical structures such as racking supports.

Though not always obvious to the naked eye, rodent prints and tail swipes may be detected using a black light (UV) torch. At this point conventional control options would be introduced.

		
<p>A band of UV dust, with mouse footprints highlighting movement</p>	<p>Mouse footprints, highlighting avoidance of bait and trap stations</p>	<p>UV gel being applied to racking</p>

Excessive use of these products, or disturbance, perhaps through enthusiastic cleaning, can result in a very confusing picture, as highlighted below!



Automating the Inspection Process

The use of electronic sensors to detect movement within the workplace or home is nothing new, with electronic and passive infra-red (PIR) sensors being used to activate lighting and alarm circuits for example. These same techniques are now being introduced to monitor for rodent activity.

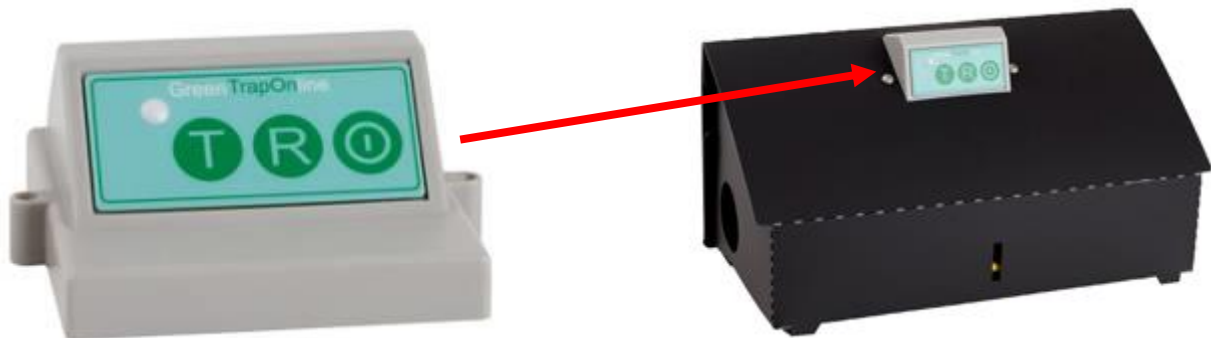
The move away from conventional monitoring systems based on toxic rodenticides will probably accelerate the introduction of electronic technology to rodent monitoring, particularly as a switch to non-toxic alternatives will generally necessitate a much increased inspection frequency.

Linking the alert to the triggering of a conventional break-back trap is the most common approach, and numerous such systems are available. Some are able to distinguish between an accidental activation and one that is the result of a capture. In the latter case the rodent carcass prevents the completion of the electrical circuit between the killing bar and base-plate that would otherwise occur were the activation accidental. *Although this technology is arguably a step forward, we consider that it does still have the fundamental drawback that if the rodent won't go in the trap, and we know they often won't, then the system is going to miss activity.*

The ideal for us is a system that requires no more than the rodent moving around within its environment in order to be detected. At least one such system does exist:

GreenTrapOnline (GTO)

This system is based on PIR detectors communicating wirelessly with a base station. The detector would typically be mounted on top of, or within, a bait or trapping station, as shown below.



However, if the rodent won't go in the device then missed detections are likely. A potential alternative is to mount the detector on a bracket, or on top of something that doesn't require the rodent to go 'inside' something. Examples of this approach are shown below.



Detector mounted on a bracket and installed into a heating conduit



Detector mounted on an upturned length of plastic guttering

The big advantage of this technology is that the rodent doesn't have to actually eat something, or be trapped, in order to be detected. Rodent presence triggers a wireless alert via SMS text or e-mail. Activation data can be reviewed on a mobile phone app or dedicated web portal.

We have found the GreenTrapOnline system to be robust, and to generate extremely interesting data. The write-up of a case study that we conducted in July 2019 can be viewed by clicking [HERE](#).

These systems are not cheap, but the cost of installing and maintaining them may be significantly cheaper than daily or weekly inspections from either a pest control contractor or site personnel. ***It must be emphasised that electronic monitoring systems cannot replace your regular routine pest control inspections; they should be part of an integrated monitoring programme. A verification protocol will be necessary to satisfy auditors that the systems are functioning correctly.***

Potential disadvantages? Rodents may avoid the monitor altogether, as they do sometimes with traps. Accidental activation will result in phantom activation messages, and wireless connections may be unpredictable. Not all environments will accommodate such systems; EX rated areas, or very wet or chemically or thermally hostile environments for example. These factors would all need to be taken into consideration when surveying and installing any remote monitoring system.



The BIG advantage though; a good system, properly installed, will provide robust 24/7 monitoring with minimal human input.

Other methods, and myths!

The pest control sector is blessed with a whole host of myths and legends, particularly about wonder devices that will cure all pest problems without the use of anything nasty and, miraculously, without affecting any domestic or other animals. Claims made for such devices are often convincing, but when delved into are backed by little or no scientific evidence whatsoever. Read on.....

Ultrasonic deterrents

It is well established fact that rodents hear and communicate at ultrasonic frequencies, far beyond those that humans, and even cats and dogs, can hear.

The claim made by many providers of ultrasonic pest deterrents is that high volume ultrasound is able to repel rodents. It's a nice idea, but ultrasound dissipates quickly at distance and can easily be blocked by objects. Consider, for example, if you listen to music in the room next to the output device you will mainly hear the bass, because the higher frequency treble has been absorbed by the wall. Ultrasound is absorbed (attenuated) even more rapidly. Furthermore, even if they hear the ultrasound rodents are very resilient and will simply avoid or adapt to the noise.

Repellents

It is true that rodents have a very keen sense of smell, in fact not only way beyond the ability of humans but also cats and dogs. Moth balls and peppermint oil are widely believed to have a repellent effect, but there is a distinct lack of evidence to support this. Furthermore, they are not approved for use in this way, as vertebrate repellents are classified as pesticides, so cannot be considered 'non-toxic', and **MUST** be approved for such use.

Further information is available from Dr John Simmons, 07855-944049,
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