WORK STUDY › OPPORTUNITIES FOR PROFIT

RODENT

KNOWLEDGE IS POWER, IT COMES FROM TRAINING

Killgerm® TRAINING

THE PROBLEM

The commensal rodents, those usually found associated with people, are the brown rat *(Rattus norvegicus)*, the black rat *(Rattus rattus)* and the house mouse (*Mus domesticus)*. (It should be noted, however, that the black rat is no longer a significant pest in the UK, being confined to probably some dockside areas only). Commensal rodents have been pests since time immemorial and have resisted all attempts to eradicate them. This is hardly surprising, given that they are highly adaptable, omnivorous creatures with tremendous reproductive potential, acute senses and a high degree of athleticism. Moreover, as recent studies in the UK demonstrate, their numbers are not diminishing.

The costs attributable to rodents in both financial terms and in human suffering are enormous and commensal rodent control is rightly given a high priority by local authorities, businesses and householders.

DESCRIPTION

Rats and mice are found wherever there is food and shelter. The availability of such resources dictates population density.

In ideal conditions, a pair of mice can produce more than 2000 offspring per year and a pair of rats 200 per year. Their gestation period is only 21 days and therefore population explosions can occur when effective control is not implemented.

Effective rodent control requires a combination of measures including surveys, proofing, habitat manipulation, sanitation and control techniques

LIFE CYCLE

MICE

In the northwest corner of Europe, the house mouse belongs to two subspecies, *Mus musculus musculus* and *Mus musculus domesticus*. In Britain *Mus domesticus* is common, whereas in the rest of Europe, *Mus musculus musculus* is the predominant species. In southwest Europe, *Mus spretus* (the Algerian mouse or Lataste's mouse) is also found.

The house mouse weighs around 25-30g and measures 60-90mm, its tail being 80-100mm long. It lives both indoors and outdoors, its diet consisting mainly of cereals. It can survive without drinking water, gaining sufficient moisture from its food. Eating only small amounts of any one thing at a time, its total food consumption is sometimes 5g per day.

RATS

Rattus rattus, the black rat (also known as the ship rat or the roof rat) is grey to black in colour, weighs sometimes 300g and is between 150 and 220mm long with a tail that measures 180-250mm. It has large prominent eyes and a pointed snout. The black rat is very agile and is often found living in the upper parts of buildings and in trees.

The black rat is omnivorous, eating around 30g of food per day. Its diet consists mainly of cereals and fruits. Living for 9-12 months, it has an average of 6 litters, each producing 6-10 young. It has become rare in parts of northern Europe where the changes in habitat have favoured the brown rat, a bigger and more aggressive species.

Rattus norvegicus, the brown, common or Norway rat has a larger body than the black rat, weighing some 500g and measuring 200-250mm, the length of the tail being 150-200mm. It has small eyes, a rounded snout and is truly omnivorous, eating 50g of food a day. Found living near water, in buildings and in sewers, it nests in burrows underground. Whilst not as agile as the black rat, the brown rat is nevertheless a good climber. It lives for 9-18 months and produces around 7 litters a year with 7-9 young in each.

Both species also need to drink daily, with a typical intake of about 20ml. This can be exploited during control measures.

INTEGRATED PEST MANAGEMENT

Effective rodent control requires a combination of measures including surveys, proofing, habitat manipulation, sanitation and control techniques. Proofing, habitat manipulation and sanitation should all be carried out after control techniques in order to avoid creating neophobic conditions, delaying bait takes.

1. SURVEY

A survey is necessary to identify the type and extent of the infestation in order to allow informed decisions to be made with regard to the proofing and hygiene measures required and the type of control techniques to be employed. Visible signs include droppings, smear marks, tracks and urine pillars.

2. PROOFING

Eliminating rodents from the inside of a building will only be a short-term solution if there are others outside that can then get in. Black rats and brown rats can climb drainpipes or trees and enter through high apertures. Brown rats can burrow in or enter via drains and sewers and a young mouse can get in through any hole with a diameter greater than 6mm. As many of the potential entry routes as possible should be blocked using rodent-resistant filling materials and nylon bristlestrip.

3. HABITAT MANIPULATION

Eliminating rodent harbourages will also help reduce populations. Rodents need somewhere to hide and breed and any such areas should be identified and eliminated or made inaccessible.

4. SANITATION

Good sanitation is essential both inside and outside buildings. All rubbish and food spillage should be removed immediately as should any old tins or tyres capable of collecting rainwater. Refuse bins and skips should be kept covered and water leaks repaired.

Sanitation in terms of disinfection is also important, in order to protect human health by controlling rodent-borne diseases. Apply a specialist disinfectant with proven efficacy against rodent-borne diseases, such as Leptospriosis, Hantavirus, *E. coli* and *Salmonella* spp.

PHYSICAL ABILITIES AND SENSES OF RODENTS

A thorough understanding of the physical abilities of rodents is very useful when designing a control programme. For instance, rats are excellent swimmers. They can swim up to half a mile in open water, travel through sewer lines against substantial currents and tread water for up to three days. Climbing is also easy for them. Roof rats and house mice are excellent climbers. Norway rats, although somewhat less agile, can climb effectively. If they can't climb, they just jump. From a standing position rats can jump vertically to a height of approximately 1 metre - and getting down is easy. If necessary, rodents can drop from heights of over 15 metres without injury.

If rodents can't get around an object, they go through it. Rodents are capable of gnawing through a variety of materials including lead sheathing, cinderblock, aluminium siding, glass and improperly cured concrete. Rodents can also squeeze through very small openings - 15mm for rats and 6mm for mice.

All of these physical abilities have allowed rats and mice to survive hundreds of years in man's environment. The following are some of the other sensory abilities that make rodents so remarkably adaptable.

HEARING

Rodents use hearing to locate objects to within a few inches. Rats and mice have a frequency range of 50 kilohertz or more, which is much higher than humans who have a range of about 20 kilohertz. Rodents make high frequency noises in various situations such as in mating but the function of these sounds is poorly understood.

VISION

Rats and mice have poor vision beyond about a metre but they are very sensitive to motion up to 9 - 15 metres away. For the most part, rodents are colour blind but very light-coloured or reflective objects may stand out in their environment and cause initial avoidance among sensitive rodents.

TASTE

Rodents have a highly developed sense of taste, which allows them to detect some chemicals at parts-per-million concentrations. This taste sensitivity may lead to bait rejection if the baits are contaminated with insecticide odours or other chemicals. Use of fresh, food-quality grain ingredients is the best guarantee of good bait attractability and acceptance.

SMELL

Odour is one of a rodent's most important senses. Rodents mark objects and pathways to and from food sources, members of the opposite sex, who are ready to mate differentiate between members of their own colonies and strangers and to tell if a stranger is a strong or weak individual.

TOUCH

Rodents have a highly developed sense of touch due to very sensitive body hairs and whiskers (vibrissae), which they use to explore their environment.

Most of a rodent's movement in a familiar area relies heavily on the senses of touch and smell to direct it through time-tested movements learned by exploration and knowledge of its home range. Rodents prefer a stationary object on at least one side of them as they travel and thus commonly move along walls, a fact which is very useful when designing a control programme. In captivity, rodents will hide quite contentedly in a clear glass jar since it "feels" enclosed and secure to them.

THE SOLUTION – CONTROL TECHNIQUES

Control techniques should ideally be designed to eliminate the infestation completely, since any remaining rodents will produce a rapid reinfestation. Control techniques can be chemical and non-chemical. Non-chemical techniques may be used on their own, such as the utilisation of live traps, glue boards and traditional back breakers but more often these methods are used to complement chemical control. Some additional non-chemical techniques such as ultrasound have not been proven to be as effective as long-term control measures.

The most effective rodenticides are the anticoagulants, which are slow acting and thus do not induce bait shyness. They have a specific antidote in case of accidental poisoning, namely Vitamin K1 (phytomenadione).

The anticoagulants are divided into first generation products, such as warfarin and the more potent second generation products, such as bromadiolone, difenacoum, difethialone, flocoumafen and brodifacoum. The latter three are single-feed products.

Products have an additional ingredient, Bitrex, an extremely bitter taste deterrent, which is included to decrease the likelihood of consumption by human beings.

The active ingredients are usually formulated as grain baits, pellets or blocks. The latter contain a certain proportion of paraffin wax and have the advantage of being more weather resistant and less attractive to non-target animals.

The application of rodenticides requires a planned, structured approach involving regular visits to observe the effects of the treatment and if necessary to replenish bait or modify the control techniques. Even after an infestation has been eliminated, continuous monitoring may be required to detect signs of reinfestation as early as possible.

The rodenticides should always be applied according to label instructions. Bait boxes (or natural cover) should be used wherever the possibility of contamination exists, where the bait requires protection from the weather or where non-target animals may be at risk. In more delicate situations, such as in food factories and domestic premises where young children are present, it is advisable to employ tamper-resistant bait boxes.

STEWARDSHIP

The requirements of the UK rodenticide stewardship regime must be met by users, which includes possession of approved certification and working to the CRRU (Campaign for Responsible Rodenticide Use) Code of Best Practice. A key element of this is the 'risk hierarchy', which is to 'use methods that have the least risk of adverse impact (i.e. are the least severe) but which will be effective.'

There is widespread contamination of UK wildlife with second-generation anticoagulants (SGARs) in particular. It is known that a high proportion of some bird populations, including barn owls, kestrels, sparrowhawks and red kites, and many mammals, such as stoats, weasels, foxes, hedgehogs and polecats, carry residues of these substances in their bodies. The UK Rodenticide Stewardship Regime aims to educate users about the risk to wildlife of exposure to rodenticides and explain how to prevent it.

http://www.thinkwildlife.org/

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RODENTICIDES

The correct use of rodenticides can be a cost-effective way of controlling commensal rodent infestations in the majority of situations. Rodenticides are best placed where the rats and mice are likely to find and eat them.

EXPOSED RODENTICIDES:

- Can pose a risk to non-target animals, those that we do not wish to harm. These can be wild birds, chickens, dogs and cats. Children may also be at risk when unsupervised. Although there is a specific antidote for anticoagulant rodenticides, it is obviously best to prevent any possible contact by non-target species.
- Particularly those that are placed externally, are likely to get damp and even indoors, as rodents are frequently found in damp cellars and attics. There are specially formulated baits such as wax blocks, which have greater weather resistance but even these will eventually deteriorate and will do so more quickly when uncovered. When dampened, grain baits will rapidly grow mould and disintegrate, losing their palatability to rodents.
- Are easily scattered by people and equipment. Rodents will scatter bait during the feeding process itself and when trying to carry loose bait to their nests.

SCATTERED BAIT CAN POSE A NUMBER OF PROBLEMS:

- By it being more difficult to ascertain how much bait has been consumed and therefore how much to replenish it.
- By being more easily available to non-target animals with the consequent risks involved.
- And by increasing the risk for contamination of foodstuffs.

The latter is a particular risk in food processing industries, though it should not be ignored in domestic situations or on farms where animal feed and harvested crops can be contaminated.

ANTI COAGULANT RODENTICIDES

FIRST GENERATION

Warfarin
The first of all anticoagulants to be produced. It has been replaced by alternatives in some areas due to resistance.

Coumatetralyl
Coumatetralyl is another first generation active ingredient. Known to be more effective than warfarin.'

SECOND GENERATION

Difenacoum
Difenacoum was the first second generation compound for warfarin-resistant rodents. It should be applied using the saturation technique.

Bromadiolone
Bromadiolone is a second generation compound for warfarin-resistant rodents. It should be applied using the saturation technique.

Difethialone
Difethialone is is the first new active ingredient to be introduced to the UK in over 20 years. An effective single feed solution to rodent problems.

Flocoumafen
Flocoumafen has a high toxicity to both rats and mice and it can be used as a single feed rodenticide using the pulsed baiting method.

Brodifacoum
A highly potent anticoagulant. Effective on both rats and mice with a low single feed required lending itself to pulsed baiting.

ACUTE RODENTICIDES

Alphachloralose
This is a narcotic and acts by slowing down the metabolism of the rodent resulting in death by hypothermia. It is therefore most effective at temperatures below 10°C. It is only approved for use against the house mouse. Underdosing can lead to sub-lethal poisoning and subsequent bait shyness.

BAIT STATIONS

These risks can be avoided or reduced by the use of bait boxes. The problem of bait scattering can also be overcome to some extent by the use of suitable bait trays. The following provide increasing levels of protection as we go down the list.

BAIT TRAYS:

Bait trays are useful in containing bait to prevent it being scattered. They are available in different sizes so that the appropriate quantities of bait can be placed according to the situation and the species. Bait trays do not offer complete protection against scattering, as they are easily knocked over, nor do they protect bait against the weather or non-target animals.

SOFT BAIT BOXES:

Simple cardboard bait boxes provide greater protection against scattering and non-target animals and those made of soft plastic, in addition, give some weather protection and can be designed to prevent accidental opening. Some cardboard bait boxes are waxed to provide a measure of damp proofing and have the additional benefit of being suitable for use with baits with high moisture content such as gel baits.

TAMPER-RESISTANT BAIT BOXES:

Tamper-resistant bait boxes are rigid boxes, usually made of plastic and often built with a system of baffles to make it more difficult for bait to be spilled from them. Experiments have demonstrated that male mice prefer boxes with separate feeding annexes to simple tunnel types but that they will eat less if the internal structure is too complex.

Some models will contain rodenticide blocks in such a way that they cannot be removed, either by holding them down when the lid is closed or by having a wire or bait rod, which can be threaded through the type of blocks that have holes in them. Rigid boxes have the added advantage of greater resistance to damage and therefore offer improved durability. They are also frequently provided with a soft spot, which allows a nail or a screw to be placed through to fix them to the substrate.

Tamper-resistant ridged bait boxes have a mechanism that makes them very difficult for unauthorised people to open. These boxes are of particular value when baiting in places where there is a need to prevent access by non-target species. It is advisable to choose bait boxes with robust but simple, fast and easy-to-operate locking mechanisms. This will result in significant time savings on big jobs.

Rodenticide bait boxes provide a further benefit in that most will have provision for attaching a label, on which details of product used and the date on which it was placed can be written. This makes for greater safety and simplifies the maintenance of a baiting schedule.

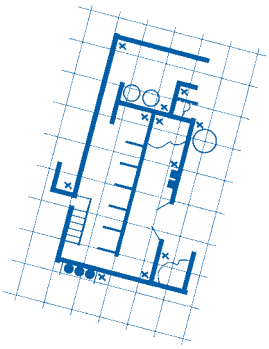
Bait boxes come in many shapes and sizes to suit most situations. It has been shown that mice prefer small bait stations compared to large ones, so bait stations designed for rats should not be used in mice control. Most bait boxes are black and it has been demonstrated that male mice prefer black boxes to white ones. Rats prefer large boxes with see-through entrance tunnels from which the bait is directly accessible. There are specially shaped boxes to fit corners and there are low profile boxes, which will easily fit underneath structures such as pallets. They are made of different materials, mostly plastic, which tests have shown are as good as or better than any other. Some plastics, depending on their type and finish, can be 'noisy' when an object is scraped against them. It has been suggested that rodents will be reluctant to remain inside boxes that are 'noisy' and resonate.

The increased requirements of many clients in the food industry have resulted in tamper-resistant bait boxes becoming the standard. However, due to the lower costs of production, many cheap sub-standard boxes have appeared on the market and if one wishes to achieve optimum takes, it is important that a quality box is chosen, which has been designed from extensive tests with rodents.

THE CRRU CODE

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.

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.

ENVIRONMENTAL RISK ASSESSMENT WHEN USING ANTICOAGULANT RODENTICIDES

All anticoagulants rodenticides, both of the first generation and the second generation, fail theoretical regulatory environmental risk assessments due to their characteristics of toxicity and persistence. This does not mean that they cannot be used, but that proper use depends on the thorough and careful application of environmental risk mitigation measures.

REMEMBER: APPLY ALL AVAILABLE AND APPROPRIATE RISK MITIGATION MEASURES EVERY TIME YOU USE AN ANTICOAGULANT RODENTICIDE

Because of these risks, and irrespective of both the type of baiting techniques used and the area to be treated, it is good practice to conduct an Environmental Risk Assessment (ERA) when an anticoagulant rodenticide is to be applied.

Guidance on ERA is available from the CRRU website

http://www.thinkwildlife.org/

The guidance document provides information about the reasons for conducting an ERA and advice about how to conduct one. The rare circumstances in which an ERA may not be needed are also explained.

The purpose of an ERA is to determine which possible adverse environmental effects may occur at any specific site and to identify which measures are necessary to protect wildlife and the wider environment as far as possible. As the name suggests, an ERA is conducted to determine risks to the environment, mainly risks to wildlife. The risks to companion animals, domestic and farm stock and human bystanders are not considered here, although some of the measures to keep them safe during rodenticide applications are similar.

KILLGERM OFFER A WIDE RANGE OF BAIT STATIONS AND BAITS FOR RODENT CONTROL

The successful AF® Range of rodent bait stations and Sakarat® rodenticide range are an effective way of controlling rodents in all situations.

AF® Rat Box

The most versatile bait box on the market with many unique features all common formulations can be used allowing a wide choice of rodenticides.

AF® Advance Mouse Box

A traditionally-sized box with a host of new features, many exclusive to the Advance Mouse Box

Sakarat® Bromabait

Ideal for use across the PCO sector, agriculture, animal husbandry and zoos, a loose grain formulation against rats and mice. Contains 0.005% w/w bromadiolone.

Sakarat® D Whole Wheat

An economical rodenticide whole wheat formulation for use in and around buildings and in open areas against rats and mice. Contains 0.005% w/w difenacoum.

AF® Atom

This small and compact, stackable rat bait box offers a high quality, affordable alternative to larger bait boxes.

AF® Underground

The AF Underground bait box offers you versatility, security and discretion that no other bait box offers.

Sakarat® Bromabait Place Packs

Packaged in 100g sachets for ease of use. Sakarat Bromabait is effective against rats and mice both in and around buildings and in open areas. Contains 0.005% w/w bromadiolone.

PX Lepto

Disinfect with PX Lepto where rodents are active, to protect yourself and your customers from rodent-borne diseases such as Leptospriosis, Hantavirus, *E. coli* and *Salmonella* spp. Contains Chlorhexidine (6% w/w) & QAC (8% w/w)

AF® Tunnel

A compact and robust rat bait tunnel with the same outstanding quality of the AF range

AF® Tyre-Baiter

Ideal for use on farms and landfill sites. It encourages communal feeding and increases uptake of bait by providing a natural feeding area.

Sakarat® Bromakill

A highly palatable and attractive rodenticide on a rolled oat base. It is effective against rats and mice both in and around buildings and open areas. Contains 0.005% bromadiolone

Sakarat® D Wax Bait

This highly effective second generation anticoagulant is a blend of cereal and palatable foodstuffs. Contains 0.005% difenacoum.

Killgerm® TRAINING

USE BIOCIDES SAFELY. ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE.

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