

Guiding principles in the Humane Control of Rats and Mice

1.0 Scope

It is often necessary to control rats and mice when they come into conflict with human interests. It is a good principle, whether controlling using lethal or non-lethal means, to do so humanely: that is to prevent unnecessary suffering. The ideal is to control infestations without causing fear or pain. Currently used methods can fall well short of this ideal and because of the very large numbers of pest rodents killed, the control of rats and mice is a major worldwide animal welfare problem. The aim of this document is to provide guidance on the humaneness of current control methods to assist people in choosing suitable methods.

This document focuses on the humaneness of control methods for rats and mice, both lethal and non-lethal, that is, it covers the impacts of these methods on the welfare of the individual animal. In order to keep our task in producing this document (at least in its first edition) to manageable proportions, it focuses on rats and mice (see Appendix 1 regarding dormice) because these are the rodents with which we are most often in conflict. The document does not address in detail important aspects other than welfare, such as the relative effectiveness of the methods, how they should be deployed, user safety, or the potential for affecting non-target species (including humans). This is because these are large subjects about which information is already available from other sources (eg Central Science Laboratory, 2002; Health and Safety Executive, 2003; Rural Development Service, 2006; Natural England, 2007; Campaign for Responsible Rodenticide Use, 2008), and in some cases also from the manufacturers of the various products.

Although the principles discussed here apply widely, particular aspects of the advice provided (eg regarding the range of permitted methods and the law governing their use) are focused on the situation in Europe and specifically the UK.

2.0 The UFAW Humane Rodent Control Working Group

This leaflet has been produced by the UFAW¹ Humane Rodent Control Working Group. This Group is working to promote welfare improvements in the control of rodents through:

- (i) providing advice and guidance about current methods
- (ii) promoting research into new, humane methods
- (iii) advocating the need for a national animal welfare advisory body to keep pest control methods under review and to provide advice about research and other needs, and to liaise with like bodies in other countries.

¹ The Universities Federation for Animal Welfare. www.ufaw.org.uk.

3.0 Why are rodents controlled?

There are more than 2000 species of rodents in the world. Most cause no conflicts with human interests. Some are endangered and need measures to protect their populations. However, a few species – mainly of rats and mice – can present threats to human interests. Rodents are controlled for various reasons including:

- Prevention of disease in humans, farmed livestock and companion animals
- Prevention of loss or damage to growing crops and stored foodstuffs
- Prevention of structural damage to property and installations
- Protection of biodiversity (eg where introduced rodents threaten native fauna)
- Because of social abhorrence of rat and mouse infestations

The common species of mice involved in infestations and controlled in the UK are the house mouse *Mus domesticus* and the Wood mouse *Apodemus sylvaticus*.

4.0 Key guiding principles

It is important to consider carefully if control measures really are needed – does the presence of rodents have to be addressed? It is not tolerable to have mice in food preparation areas but many may take a more relaxed attitude to those in a garden shed. If there is a problem that has to be addressed, can it be solved by improvements to the integrity of the building? That is, can it be solved through measures to exclude rodents? If it is necessary to capture or kill them, then try to use methods that minimise the risk of suffering to the animals.

Control may only be needed when there is a combination of circumstances that create a conflict with human interests. Control of rat or mouse populations should not be taken to be a standard procedure to be always undertaken as a matter of course regardless of circumstances but, because of its potential welfare impact on the animals (including their dependent young), it should be based on an assessment of the need.

Thus in tackling problems caused by rats and mice, those controlling rodents should respect their welfare by adhering to the following principles:

- affect no more animals than necessary to achieve the aim
- refine control methods so as to minimise unnecessary suffering (fear and pain)

To summarise, there is nothing nonsensical or paradoxical about *killing kindly*. Where killing has to be done, ‘kindly’ is the right way to do it.

5.0 Call in a pest control agency or do it yourself?

The first important decision for anyone who wishes to tackle a rodent problem is whether to call in a pest control operative from the local authority or from a professional pest control agency, or to carry out control measures themselves. The information presented here about the various methods gives some insight into the issues that anyone who takes on this work will have to consider. For example, if you are not sure that you can *humanely* kill a rodent that has been caught alive in a trap,

then do not to set a trap without first making some arrangements for dealing with this situation (ie plans for release – see below - or despatch). If you cannot take whatever actions may be necessary to use any of the methods described in this document as humanely as possible then it may be better to call in a pest control operative who will be competent and capable of humanely using the methods selected. The choice of appropriate and humane methods can be discussed with the operative. If you use a commercial pest controller you can seek assurance from them that they are competent in the methods they propose to use and discuss with them the humaneness of the method employed.

When calling in a professional pest control operative it is important to discuss in advance arrangements for any animals found that will need to be humanely despatched (eg those injured but alive in traps, or those dying as a result of rodenticides). Will it be you or the pest controller who deals with these? And what will be the arrangements for animals found ‘out of hours’ in the evening/ weekend?

6.0 Control Options

6.1 Prevent access

The best cure is prevention. If there is no access to food, water, shelter or nesting sites, rodents will go elsewhere and will not be able to produce or maintain significant populations. Therefore, where practicable, preventing access – rodent proofing - especially of food storage areas, should be the first measure adopted for the prevention and control of infestations. However, effective proofing against mice is very difficult. Good housekeeping to ensure that food and waste are inaccessible is essential. Materials (such as wire wool) are available from pest control suppliers and DIY stores that can help prevent rodent entry into buildings, for example, through cracks and holes. Measures should be taken to ensure the swift and humane catching/killing of any rats or mice that may be trapped inside at the time of proofing, and proofing works should not be completed until the site is pest free. Otherwise, rodents trapped inside are likely to cause damage.

6.2 Rodenticides

Rodenticides are the most widely used approach to control of rats and mice. The anticoagulant agents are widely considered to be the most cost-effective method of controlling substantial infestations.

6.2.1 Anticoagulant rodenticides.

Anticoagulants kill by disrupting blood clotting mechanisms and leading to death by blood loss. Bleeding can occur externally or into the gut, tissues, body cavities, joints, and inside the skull.

Pros: Safety: successful treatment may be possible in cases of accidental human or companion animal consumption of the rodenticide.

Cons: Rats may show signs including weakness, lameness, and breathing difficulties, for up to about 48 hours prior to death (which in rats is typically about 3-9 days after ingesting a lethal dose). Bleeding into joint spaces and inside the skull is known to be very painful in humans and there is a concern that anticoagulants may cause this in rodents. For this reason the UK's Pesticide Safety Directorate described this method as 'markedly inhumane' (Mason & Littin, 2003; MAFF, 1997).

Anticoagulant agents are available for use by the public.

6.2.2 Alphachloralose

If ingested in sufficient quantity, it depresses brain activity, slows the heart rate and depresses metabolic rate leading to death through hypothermia and respiratory failure.

Pros: Because of its mode of action – anaesthesia leading to death through respiratory failure and hypothermia – it is thought to be humane. The UK's Pesticide Safety Directorate described this method as 'relatively humane' (MAFF, 1997).

Cons: It is not legally permitted or suitable for use against rats.

6.2.3 Cellulose pellets

It is suggested that these cause disturbance to the normal functioning of the digestive tract, resulting in death after about 4-7 days, with animals becoming huddled and lethargic in the last few hours before dying (Mason and Littin, 2003).

Pros: Rodents killed by this method are unlikely to cause secondary toxic effects if eaten by predators.

Cons: It seems likely, in view of its probable mode of action and the signs reported, that there would be some associated adverse welfare effects but we are unaware of detailed data on the clinical or pathological effects from which to assess the welfare impact.

6.3 Trapping

Various types of traps are discussed below. An important welfare consideration in the use of traps is the frequency with which they are inspected. Live traps need to be inspected often enough to avoid compromising seriously the welfare of trapped animals by, for example, hunger, thirst or exposure. Traps designed to kill need to be inspected so that any animals that may have been injured but not killed can be despatched as soon as possible. There is obviously a tension here between the welfare advantages of very frequent inspection and as to what can be realistically be done in practice. We have made suggestions below about inspection times in some cases but those responsible for setting traps will, in all cases, have to use their judgment about inspection times taking account of welfare and other considerations. Once an infestation has been controlled, traps (live or other) should not be re-set on the off chance of subsequent infestation.

6.3.1 Live-capture traps

Rats and mice can be caught in live-capture traps. This option has an immediate attraction to some who wish to avoid killing. However, their use requires careful thought because they can have a significant adverse welfare impact on the trapped animal.

Pros: If non-pest species are caught they can be released.

Cons: There are two important disadvantages of live traps. First, the welfare consequences of being trapped which may include injuries associated with trying to escape. Secondly, captured rodents must be disposed of (ie released or killed) humanely. Dealing with live caught animals, especially rats, is very challenging. Simply letting animals go is likely to be unsatisfactory for various reasons (including their welfare – see below) and killing live rats and mice humanely is beyond the experience (or competence) of many people.

The welfare of captured rodents is covered by the Animal Welfare Act 2006 (see Box 1). This Act puts in place a duty of care for the welfare of all animals under human control. If live traps are used they must therefore be of a suitable type (unlikely to cause injury to the animals); they must be inspected sufficiently frequently so that trapped animals are not at risk of water or food deprivation or to exposure. We recommend at least twice daily, this is a compromise between what is ideal for welfare and what is likely to be practicable. Trapped animals must be dealt with humanely. Release of an animal elsewhere is not necessarily a humane thing to do – translocated animals may fail to adapt to or integrate into new territory and may suffer and die as a result (Mason and Littin, 2003). Killing is much less likely to carry a risk of causing suffering than release in an unfamiliar area, and release of some species may be illegal. See Box 1 for notes on the law relating to release of rodents.

Devices are available (at least to professionals) that can send a signal to a mobile 'phone to indicate when a trap has been sprung. The use of such devices means that animals caught in traps can be despatched soon after capture so that risks to welfare can be minimised. Inspections should still be carried out at appropriate intervals in the event of no 'alerts' being received in order to check if this is because traps are empty or failure of the messaging system.

When the intention is to kill live trapped rodents, it is necessary to have made preparations to use a humane and effective method of killing prior to setting the trap. See Box 2 for information about killing methods. As noted in Box 1, the welfare of trapped rodents is covered by the Animal Welfare Act 2006. However, if the animal is killed in an appropriate and humane manner then, under Section 4(4) of this Act, the suffering will not be considered to be unnecessary.

In summary, whilst well designed live-catch traps have the potential to be humane, they also have the potential to be *used* very inhumanely. This can result from two main factors: the length of time animals are left in the trap and the method of killing. Both of these issues should be considered carefully prior to using such traps.

Box 1. Law relating to release of captured rodents

The legal framework relating to the release of captured rodents includes both (i) animal welfare and (ii) species conservation elements. The latter addresses the potential risks to UK wildlife and biodiversity of releasing species that are not considered to be 'ordinarily resident' in the UK.

(i) The welfare of captured rodents is covered by the Animal Welfare Act 2006 (http://www.opsi.gov.uk/acts/acts2006/en/ukpgaen_20060045_en_1), which puts in place a duty of care for the welfare of all animals under human control (even on a temporary basis). The implications of this to the release or killing of captured rodents is unclear but the capture, release or killing of rodents in circumstances that compromised or might compromise their welfare may be open to challenge if the animals needs are not met as far as is reasonable in the circumstances. If suffering is caused which is deemed to be unnecessary then this will constitute an offence under this Act. Whether the suffering is unnecessary requires the consideration of a number of factors such as whether the suffering could have reasonably been avoided or reduced, whether the control operation was for a legitimate purpose and whether the suffering was proportionate to the purpose of the control operation concerned.

(ii) Section 14 of the Wildlife and Countryside Act 1981 (WCA) (available at http://www.opsi.gov.uk/legislation/about_legislation.htm) prohibits the release into the wild any animal which is 1) of a kind that is not ordinarily resident in and is not a regular visitor to GB in a wild state or 2) is included in Part 1 of Schedule 9. Currently (June 2008), the black rat (*Rattus rattus*), the fat/edible dormouse (*Glis glis*), the grey squirrel (*Sciureus carolinensis*) and the Mongolian gerbil (*Meriones unguiculatus*) are listed on Part 1 of Schedule 9 and therefore cannot be released, except under licence.

Under the WCA there is no prohibition on the release of other species of rats or mice which are ordinarily resident in GB. For example, the view of the Department for the Environment, Food and Rural Affairs (Defra) is that the release of brown/common rats (*Rattus norvegicus*) into the wild is not unlawful under the Wildlife and Countryside Act 1981 because, despite their non-native origins, they could be classed as 'ordinarily resident' in Great Britain as they are now well-established. However, this is not to say that it is acceptable or permissible to release them on other people's property.

Bearing in mind the exceptions above, although the law does not prevent the release of captured target animals (brown rats or mice), it is often likely to be an unwise thing to do either because it is counterproductive to control and/or because it may have adverse welfare consequences for the animal (see text). Release near the point of capture is unlikely to solve the problem as the animals are likely to return unless the premises have been effectively proofed. Release in an unfamiliar environment may have adverse welfare consequences as animals may have trouble finding food and shelter. Also if the area contains suitable habitat it is likely to already be occupied by other members of their species and may not support additional animals.

6.3.2 Spring-powered killing traps (known as snap traps, spring traps, or break-back traps)

These traps are intended to cause death by crushing vital organs.

Pros: Death can be very rapid.

Cons: If animals are not killed outright but are instead caught by for example a limb, tail or by the muzzle, they will suffer pain and distress. Unless discovered very promptly by the operator, this may lead to a prolonged time to death as a result of injuries and exposure and possibly also from wounding by other animals. These traps do not offer the possibility of releasing non-target species unharmed.

For welfare reasons, only traps with the power and of a size and design appropriate to kill the target animal should be used, they should be well-maintained, set and positioned so as to minimise the risk of causing sub-lethal injuries. They should also be positioned so as to minimise the risks of harming non-target species (eg birds), by placing them, for example, under cover in runs large enough only to permit the target species. Spring traps must be placed in tunnels (see Rural Development Service, 2006).

As even the most appropriate traps set to the best standards have the potential to mis-catch occasionally, they must be checked as often as possible and, we suggest, at least twice daily (see comments on inspection frequency above). Animals trapped but still alive must be humanely killed immediately on discovery (see Box 2).

Under the Pests Act of 1954, the Spring Traps Approval Order 1995 (as amended) makes provision for an approval procedure for all spring traps. Information on spring traps that are currently approved is provided at: www.defra.gov.uk/wildlife-countryside/wildlife-manage/pest-control/approved-traps.htm.

There is currently, under this legislation, a blanket approval for all break-back traps commonly used for the destruction of rats and mice.

There is no requirement for traps to be tested for humaneness prior to being placed on the market and, as far as we are aware, no information is available on the humaneness of the various designs available. Mason and Littin (2003) reported evidence that between designs of snap traps used in the USA, the incidence of mis-captures by a leg or tail varied from 4 to 57%.

Box 2. Humane methods for killing live-trapped rats and mice

The Wild Mammals Protection Act 1996 requires that in the context of pest control, animals should be killed in a 'reasonably swift and humane manner'.

As outlined in the text, many people may find that humane killing is not an easy procedure.

The following methods are considered to be humane:

- Destruction of the brain by a strong and accurate blow to the head with a suitable implement
- Lethal overdose of appropriate gaseous or injectable anaesthetic (this technology is not available for general use)
- Destruction of the brain by shooting

The latter two methods are unlikely to be available or applicable in most cases. The efficacy and humaneness of the first, depends on a strong and accurate blow with a suitable implement such as to destroy the brain. In the case of a mouse caught on a glue board, some achieve this by turning the board over and powerfully and instantly, crushing the mouse beneath it. Removing live animals, especially rats, from traps and restraining them to deliver such a blow is very difficult and potentially dangerous – it is important to avoid bites. Some operators advocate allowing the rat to run into a sac, held over the end of the trap before it is opened, and then gripping the animal through the sack to hold it still to deliver a heavy blow to the head. If the blow is delivered with sufficient force and accuracy this is a humane and reliable method but the humaneness is obviously dependent on these two factors - force and accuracy. The method requires skill and a firm resolve. Not everyone is suited temperamentally to these procedures for killing live-caught rodents.

Drowning

Some have argued that drowning may be seen as having various advantages for the householder - it is easy to undertake (requires no extra restraint of the trapped animal nor removal from the trap) and requires no specialist equipment. It is effective providing the animal is submerged for long-enough (a few minutes). The time to death of rats in fresh water was found to average 2.6 minutes (Yamamoto et al, 1983). However, drowning is likely to cause severely unpleasant feelings of fear and pain or extreme discomfort associated with wanting to breathe and with water entering the respiratory tract. It is a matter of judgement whether one considers live trapping followed by drowning to be worse than other methods in current use (several of which, as described, can have severe adverse impacts on welfare) but the consensus view of the UFAW Working Group is that drowning is not humane method and should be avoided. This is in line also with the Rural Development Service's (2006) advisory note on rat control which stated that: 'Drowning is not a humane method of dispatch and could result in prosecution...'.

After killing, regardless of method used, it is very important to confirm death. The important sign to check is:

- No breathing or other movement.

Where experience allows, other signs that operators may wish to check for are:

- No blink reflex if the surface of the eye is gently touched with a soft implement (eg a feather, straw, cotton-bud stick)
- No reaction to a sharp pinch of the soft tissue of a paw
- No heart beat

If there is any suspicion that an animal might still be alive, the killing procedure should be repeated immediately taking care to ensure it is effective.

6.3.3 Glue boards.

These are what their name suggests: boards covered in a viscous glue. Animals stick to these boards and unless killed, will die, probably slowly, as a result of injuries, starvation, dehydration, exposure or suffocation.

Pros: Non-toxic and therefore may be seen as advantageous in some food processing environments.

Cons: Unless animals that become stuck on glue boards are promptly killed using a humane method (see Box 2), they will be at increasing risk of injuries associated with escape attempts, starvation, dehydration, exposure (and possible injury through aggression from other animals), or suffocation if their muzzles become stuck in the glue. Because it is perceived that there is a high risk of severe welfare consequences, Mason and Littin (2003) state that they '*tend to be avoided by responsible pest control operatives*'.

Glue boards should only be used when they can be checked very frequently to avoid the above risks (at the very least twice daily).

6.3.4 Stretched rubber ring strangulation system.

These traps operate by, when triggered, releasing a stretched rubber ring which closes tightly around the rodent's neck causing death by constricting the windpipe and the blood vessels that supply the brain. A trap of this design has passed New Zealand's standard for humane traps – which requires that traps cause irreversible unconsciousness within 180 seconds.

Pros: Non-toxic and therefore may be seen as advantageous in some food processing environments.

Cons: The same considerations apply as with spring-traps (above).

6.3.5 Gas traps

When mice enter this kind of trap, an electronic detection system triggers the closure of the doors of the trap and the release of a measured dose of carbon dioxide. At sufficient concentrations, the inhalation of carbon dioxide causes loss of consciousness and death.

Pros: Does not involve manual killing. If the gas concentration is sufficient, unconsciousness is likely to occur in a few (<30) seconds and death within about two minutes.

Cons: It is likely that inhalation of carbon dioxide causes some discomfort in the brief period before unconsciousness. This method is not available for use by the public and these traps can only be used by specific pest control professionals and, currently, for the control of mice only.

6.3.6 Electrocution devices.

These devices deliver an electric shock to the mouse or rat that enters them which causes death by causing cardiac arrest.

Pros and Cons: The humaneness of these devices will depend upon whether sufficient current runs through the brain and for long enough to cause immediate loss of consciousness from which the animal will not recover prior to death. If this occurs then, based on studies of electrical stunning and killing of farmed animals, it is likely that the method is very humane; if not, and the animal remains conscious, the shock is likely to cause severe pain prior to the animal's death from cardiac arrest (probably within 2 minutes). We are not aware of much information about the efficacy and humaneness of these devices.

6.4 Repellents

Several products are marketed that may repel rats and mice including some that emit ultrasound and others that are based on chemicals. Rats and mice are resourceful and persistent animals and are not easy to repel. In a review of literature on rodent control, Mason and Littin (2003) concluded that ultrasound emitting devices '*seem to have little or no success*'. Because animals are free to move away from repellants, they are unlikely to have significant welfare impacts.

6.5 Other Methods

For completeness, two other procedures - neither applicable for use by the general public (in one case because of safety risks and in the other because it is not a permitted method) - are briefly mentioned below.

6.5.1 Aluminium phosphide

Aluminium phosphide can be used only by professionals, for the fumigation of burrows out of doors. In contact with moisture, it produces phosphine which is a highly toxic gas. It causes death by blocking cellular metabolism leading to death through cardiac and respiratory failure. Affected rodents show signs of respiratory irritation and pain and other forms of discomfort (Mason and Littin, 2003).

6.5.2 Explosive propane/oxygen mixture

This explosive gas mixture has been used to destroy burrows by blast damage on ignition after it has been pumped into the burrow system. This is **NOT** a permitted killing method. See Defra website: <http://www.defra.gov.uk/wildlife-countryside/vertebrates/pdf/rodenator.pdf>

6.6 Dealing with partially poisoned animals

During treatment with rodenticides, rats and mice may sometimes be found poisoned but still alive. Such target animals should be humanely killed immediately (see Box 2) and disposed of safely.

7.0 Conclusions and recommendations

It is apparent from the above that there is no perfect method of control. It is not possible to make generic recommendations about which methods will be acceptable from a humaneness point of view in all situations. This is because, it is clear that the humaneness of the various methods can vary greatly according to how carefully they are used. Considering the factors above, and relating them to your particular situation, will help ensure the risks of causing suffering are minimised.

To summarise:

- Where possible, in preference to catching or killing methods, use non-direct methods (such as proofing and good house-keeping) to solve the problem or to reduce the need for catching/ killing to a minimum.
- Decide if you are able to undertake all necessary steps humanely, including dealing with any injured animals and the killing of animals if needed. If not call a pest control operative.
- Where live capture or kill traps are used, they must be set only after ensuring that the practicalities of checking the traps at appropriate intervals (see above) and of humanely killing any animals caught, have been considered and planned for.
- Only use traps designed to catch or kill your target animal.
- Never set a trap if you do not know how to set it to minimise the likelihood of mis-captures and injuries.
- Ensure you follow label directions when using rodenticides. This will increase the chances of animals taking a lethal dose and dying as quickly as possible.
- Never set a trap yourself if you are not prepared to: (i) inspect the traps frequently enough to prevent unnecessary suffering, (ii) deal humanely with any rats or mice caught, and (iii), deal with any animals injured.

8.0 Disposal of dead rats and mice

Rats and mice (dead or alive) can carry infections that are dangerous to humans and other animals. If killed by rodenticides, carcasses are likely to carry residues of rodenticides that can present serious risks to wildlife scavengers or predators. Carcasses, bait stations and uneaten bait should be disposed of carefully and hygienically according to current legislation and the advice on rodenticide product labels. For further advice contact the product manufacturer or your Local Authority.

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Appendix 1. A note about Dormice

Defra does not consider 'Dormice' to be covered by the term 'mice' under the Pests Act 1954 or Orders made under it. Dormice are not closely related to other mice: mice are in the family Muridae and Dormice are in the family Gliridae. Although, edible dormice (*Glis glis*) do live in houses (lofts) in certain parts of the country, they cannot be trapped or killed except under licence. All UK Dormice species are included in Schedule 6 of the Wildlife and Countryside Act 1981 (WCA) and a licence is needed from Natural England for '*setting in position an article which is of such a nature and so placed as to be calculated to cause bodily injury to any wild animal included in Schedule 6 which comes into contact therewith*'. Dormice are protected from any trap, snare, electrical device for killing or stunning or any poisonous, poisoned or stupefying substance. Furthermore, a licence is needed in order to use various other methods of taking (capture) which are not calculated to cause injury, eg nets (under WCA, Section 11(2)(a)). For a full account of the legal prohibitions on taking and killing animals on Schedule 6 see the WCA Section 11.