

An assessment of animal welfare impacts in wild Norway rat (*Rattus norvegicus*) management

Sandra E. Baker\*, Michael Ayers, Ngaio J. Beausoleil, Steven R. Belmain, Manuel Berdoy, Alan Buckle, Christopher Cagienard, David Cowan, Jane Fearn-Daglish, Peter Goddard, Huw D.R. Golledge, Elizabeth Mullineaux, Trudy Sharp, Alick Simmons, Erik Schmolz

\*University of Oxford, Department of Zoology, Oxford, Oxfordshire, UK

\*[sandra.baker@zoo.ox.ac.uk](mailto:sandra.baker@zoo.ox.ac.uk)

Online Resource 4:

## Standard Operating Procedure UKRAT002: Cage trapping and killing of rats with a concussive blow to the head

### Background

Norway rats (*Rattus norvegicus*) frequent urban and rural areas and may be found on commercial, municipal and domestic premises. They cause significant economic losses, eating 25-30 g of food per day each and contaminating far greater quantities with droppings, urine and hairs. They also transmit disease, cause chewing damage and create fire hazards by gnawing electrical wires. Cage trapping is one of several rat management methods with varying degrees of efficacy, including anti-coagulant poisons, spring traps, cholecalciferol, non-toxic lethal feeds, shooting, gassing, electrocution traps, glue traps, chemical repellents and proofing. Sonic and electro-magnetic deterrents are also available but there is little or no evidence that these methods are effective.

Rats may be cage trapped using cage traps (CTs) and then humanely killed. Relocation is not recommended on welfare grounds. This Standard Operating Procedure (SOP) is for cage trapping of rats followed by humane killing with a strong and accurate concussive blow to the head (CBH), using a suitable heavy implement. This SOP is a guide only; it does not replace or override the legislation and should only be used subject to the applicable legal requirements.

### Application

- The Prevention of Damage by Pests Act 1949 makes local authorities responsible for ensuring that their districts are kept free of rats (as far as is practicable). The Act also requires occupiers of non-agricultural land to notify the local authority if 'substantial numbers' of rats are living on or resorting to the land. Occupiers of agricultural land are not however required to notify the local authority regarding rats on their land. Under the Act, local authorities have the power to require

landowners and occupiers to control rat infestations on their land. Where necessary the local authority can conduct the control work and recover the cost from the landowner or occupier.

- Rats will thrive where there is cover, food and water and infestations occur in diverse circumstances as a result, including farms, food processing facilities, factories, hospitals, prisons, sewers, parks and gardens, and homes.
- Rats can legally be trapped at any time of year. They may breed year-round during mild conditions or if living indoors. Control should be undertaken promptly as soon as a problem is identified. Leaving a small infestation unmanaged may allow it to develop, increases the risk of damage and disease and makes subsequent control more difficult and expensive.
- Long-term reduction in rat numbers might be best achieved by trapping before breeding peaks, but trapping females with dependent pups raises welfare issues for the pups.
- Rat management campaigns may involve the use of more than one method as a combination of methods may prove most effective. Choice of method(s) will depend on the scale of the problem, the resources available (including competence/experience of the person conducting the management) and risks to non-target animals, people and hygiene.
- Rats tend to avoid areas that are regularly disturbed. Effective trapping relies on locating suitable runs and careful positioning of traps. Traps are baited to encourage rats to enter them.
- Cage trapping can be useful as part of a larger rat management campaign, or where toxins are either not desirable or not permitted, where rats are not taking poisoned baits, or to capture remaining rats following a poisoning exercise. Cage trapping can be a useful alternative to poisoning where resistance is suspected or when a high-value crop needs protection. Large numbers of traps are usually needed and their deployment, checking, re-siting and setting are time-consuming and labour-intensive. CTs are bulky and may not be practical for small spaces.
- Cage trapping is also used on small-scale applications, such as by members of the public for killing rats around their homes. Unlike using poisons and fumigants, trapping has the advantage of retaining the rats (allowing simultaneous monitoring of rat numbers). When they are then killed, they do not decompose out of sight (causing unpleasant smells) and do not pose safety risks to humans and other animals.
- Cage trapping is conducted using cage traps (and sometimes box traps), some of which allow multiple captures. Cage traps are usually rectangular and constructed from wire mesh. They have a mesh or sheet metal trap door which is held open until the trap is triggered, either by a rat standing on a treadle or taking bait from a trigger inside the trap. When the trap is triggered, the door is closed (usually by a spring) and the rat is retained in the trap. Cage traps for rats measure approximately 35 x 15 x 15cm. Cage traps with a funnel entrance and one-way door are also available.

- Cage trapping can be targeted in many circumstances where rat activity arises, because it is relatively safe for non-target species, users and other people.
- Proper checking and humane killing of trapped rats are time-consuming and labour-intensive. In general, there is no legal requirement to check CTs in the UK but there is a legal obligation under The Animal Welfare Act 2006 (and its analogues in Scotland and Northern Ireland) not to cause unnecessary suffering to a captured wild animal. However, The Act does not specify how frequently live capture devices, such as cage traps, should be checked. Both Natural England and the Universities Federation for Animal Welfare (UFAW) guidelines recommend that CTs for catching rats are checked at least twice daily.
- Dealing with live trapped rats is challenging. Releasing rats is not recommended; letting them go near the point of capture is unlikely to solve the problem unless premises have been effectively rodent-proofed; release into an unfamiliar environment may have negative welfare and legal consequences; and rats are likely to be unwelcome there. The humane killing of rats is likely to be beyond the experience and ability of many people and repeated killing (as done by pest control operators) can cause operators emotional distress over time.
- Humane killing of live trapped rats is most efficiently and practically conducted using a CBH to destroy the brain. This method must be executed quickly and skilfully to ensure a rapid and humane death. Drowning is not an acceptable method.
- Following successful treatment of rats, it is vital that foods are stored securely and food spills cleared up, potential harbourage is cleared, vegetation kept short around rat runs and burrows and structures proofed against access by rats; otherwise re-infestation is likely to occur.
- Revisit the trapping site regularly to monitor for new activity/damage.

## Animal Welfare Considerations

### Impact on target animals

- Any rat caught in a trap becomes a Protected Animal under the Animal Welfare Act 2006. The person deemed responsible for a Protected Animal is obliged not to cause it unnecessary suffering which could reasonable have been avoided or reduced. An offence is committed, whether through an act, or a failure to act, and it is also an offence not to provide for an animal's needs, such as food, environment and protection from pain, suffering, injury and disease.
- A key welfare concern with cage trapping is the time a trapped animal spends in a trap before it is discovered. A trapped rat may be frightened and distressed, or may have been injured either by the trap mechanism, while trying to escape, or by a predator or conspecific attack. Trapped animals are also at risk of exposure, dehydration, starvation, shock, capture myopathy

and attack by predators. They could potentially also be injured by the trap door mechanism or when trying to escape. CTs need to be checked regularly.

- The other main concern related to cage trapping is what happens to the animal once it is found in the trap and how much it suffers as a result. It is not recommended that rats are released elsewhere because translocated animals may not adapt to or integrate into a new territory, and may suffer or die as a result. Killing cage trapped rats humanely is much less likely to cause suffering than release into an unfamiliar area, which could potentially constitute an offence under the Animal Welfare Act 2006.
- It is therefore recommended that, if a rat is captured alive, it is swiftly and humanely killed using a CBH as described in *Procedures* below. This method involves destruction of the brain by applying a strong and accurate blow to the back of the head with a suitable implement. Potential alternative methods might include shooting the animal in the trap, or administering a lethal overdose of appropriate gaseous or injectable anaesthetic. However, shooting a cage trapped rat with an air pistol is unlikely to be practical or safe for rat management purposes and the humaneness of this approach will depend on the skill of the operator and the behaviour of the trapped rat. Restrictions around the use of anaesthetics are likely to mean that these are also impractical for wider use in the pest control industry. Gaseous anaesthetics raise significant safety and environmental concerns and some are irritant to airways.
- Multiple captures in multiple-capture traps can result in stress and cannibalism.
- Cage trapping should be avoided in very cold weather conditions.
- Devices are available that send an alert to the trap operator when a trap is triggered, thus potentially reducing the amount of time an animal spends in a trap. Traps should still be checked regularly in case of device malfunction.

### Impact on non-target animals

- If lactating females are trapped, their dependent pups will die of starvation or dehydration unless they are found and humanely killed.
- CTs should be safer for non-target animals than some other methods, but livestock and pets should be excluded from areas where traps are set.
- Live non-target animals caught in traps must be examined for injuries and signs of illness or distress and dealt with as follows:
  - o Animals which are unharmed or have only received minimal injuries such as minor cuts or abrasions should be immediately released at the site of capture (provided they can be released legally).

- o Animals which have more severe injuries or which are suffering from thermal stress, hunger or dehydration should either be humanely killed (unless protected) or should receive appropriate attention. An animal suffering from thermal stress can initially be placed in a suitable quiet holding area which provides warmth or shade to allow recovery before release. Where necessary animals should be given food and water. Animals with treatable injuries that cannot be immediately released or those failing to recover from thermal stress should be presented to a veterinarian or a registered wildlife carer for treatment.
- o Animals that have injuries which are untreatable or which would compromise their survival in the wild should be humanely killed using a technique appropriate for the species.
  - If a domestic pet is caught, it should be taken to the nearest vet, animal shelter or council pound where it can be examined for injuries, scanned for a microchip and the owner contacted, or assessed for suitability for re-homing.
  - Animals listed on schedule 9 of the Wildlife and Countryside Act, e.g. American mink, must not be released, and should either be humanely killed using a suitable method, or taken to an animal shelter.
  - If a live trapped rat is eaten by a predator, there is no secondary threat to the predator as is the case with poisoning.

## Health and Safety Considerations

- Rats carry diseases that may be harmful to humans and other animals (including Leptospirosis [Weil's disease], Toxoplasmosis, Hantavirus and Salmonella). The Health and Safety at Work Act 1974 makes employers responsible for the health and safety of their employees, including managing the risk of rats transmitting disease. The Health and Safety Executive's Control of Substances Hazardous to Health (CoSHH) regulations require employers to make sure an assessment is conducted to identify risks to human health arising from rat-borne diseases.
- Good personal hygiene is encouraged when handling wild animals. Routinely wash hands and other skin surfaces if contaminated with faeces, blood and other body fluids and after handling traps. Cuts and grazes should be treated and covered with a waterproof dressing.
- Wear waterproof gloves for protection from contamination.
- Operators should be protected by tetanus immunisation in case of infection of scratches/bites.

## Equipment Required

### Cage traps

- Rat cage traps.

## Other equipment

- Bait, e.g., chocolate nut spread.
- Personal protective equipment including waterproof gloves.
- Pliers for adjusting traps.
- Heavy metal or heavy wooden blunt implement for killing trapped rats.
- Hessian sack for restraining rat during killing with a blow to head.
- Waterproof bag for carrying rat carcasses.

## Procedures

### Surveying for rat activity

- Effective rat trapping relies on locating rat runs. Before setting traps carry out a survey to determine where rats are living, feeding and drinking and the routes they take between these places. All areas of activity must be identified to minimise the risk of reinvasion. All buildings and surrounding areas, including contiguous hedgerows and ditches should be surveyed.
- Key features to look for include holes/burrows (6-9cm diameter), runs (5-10cm wide through vegetation or along linear features – greasy marks may be left where rats contact hard surfaces), droppings (15-20mm long, straight and often flat at one end and pointed at the other, moist when fresh), damage (chewed/gnawed materials, e.g. food stuffs, edges of doorways and holes, wooden features, electrical wiring), footprints/tail marks in soft mud/dust/bulk grain, sightings of live/dead rats and a musky smell.
- The survey should also seek to establish any particular risks or likely problems, e.g., risks to non-target animals, hygiene failings and structural faults.

### Setting and placing traps

- Wear gloves for operator protection and to help mask human odours.
- Weather any new traps to eliminate odours related to manufacture or humans.
- Traps are deployed, baited and set straight away; traps should be provisioned appropriately for the trap inspection frequency. Existing food sources should be left undisturbed.
- Careful placement of traps is crucial to maximise effectiveness and minimise welfare impacts. Traps should be placed in a sheltered position (with regard to animal welfare and public access), in areas of obvious rodent activity, such as on runs or near active nests or droppings.
- Make sure each trap is functioning correctly before setting it.
- Carefully pre-set the trap according to the manufacturer's instructions before placing in its final position. Adjust the trap mechanism, if necessary, using the pliers.

- Position traps on rat runs at right angles to the rat's direction of travel as estimated from the survey, ideally alongside a wall or similar linear feature, with the door end facing the wall, close to but not touching the wall so the rat will pass under the open cage door between the trap and the wall. Set the trap firmly in position and flush with the ground. Conceal the base of the trap with a light covering of soil/leaves if setting outside. Where possible position traps amongst cover/behind boxes etc. Make sure the setting rod and cage door do not foul on the wall, or on rubbish or debris thus interfering with the effective operation of the trap. Do not set traps where or when they will be exposed to extreme weather/temperatures, or close to water where there is a risk of flooding, to avoid rats drowning in traps.
- Deploy plenty of traps (recommendations include  $\geq 12$ , 20 per poultry house and 2-3 dozen in a commercial establishment).
- Keep detailed records of the number of traps set and plans of where they are positioned. Keep these up to date for traceability.
- Traps should be checked twice a day, shortly after dawn and at dusk, and trapped rats quickly and humanely killed. Trapped rats must be killed as soon as possible after capture.
- Continue trapping until rat activity in the area ceases. Consider moving traps every two weeks if rat activity continues.
- Once effective rat control has been achieved this can be replaced by a prevention strategy.

#### Humane killing of trapped rats or dependent pups

- Live trapped rats must be killed quickly and humanely using an appropriate method.
- The most suitable technique for humane killing in these circumstances is destruction of the brain with a strong and accurate CBH using a suitable implement.
- The operator should enter the trapping environment alone and trapped rats should be approached carefully to minimise panic, further stress and risk of injury of the trapped rat.
- Kill the trapped rat swiftly. Run the rat from the trap into a sack. Encourage the rat into a corner of the sack and restrain it there to prevent it from moving. Locate the rat's head and strike the back of its head accurately and strongly with a suitable heavy and blunt instrument.
- Death of the animal should always be confirmed by observing the following:
  - o Absence of rhythmic, respiratory movements;
  - o Absence of eye protection reflex (corneal reflex) or 'blink';
  - o A fixed, glazed expression in the eyes; and
  - o Loss of colour in mucous membranes (become mottled and pale without refill after pressure is applied).

- If the animal is not dead then repeat the killing method at once. Use a secondary method to ensure death (cervical dislocation, exsanguination, destruction of the brain) before disposing of the carcass.
- If more than one animal is trapped on the same trap, kill them one at a time, working as quickly as possible while maintaining accuracy.
- Personnel performing manually applied CBH must be properly trained and monitored for proficiency with this method of humane killing. No more than a few animals should be killed in this way at one time.
- If lactating females are trapped, efforts should be made to find any nests containing dependent pups and humanely kill them, to prevent them from dying of starvation or dehydration.

### Disposal of rat carcasses

- Rats can carry infections that are dangerous to humans and other animals. Carcasses should be disposed of carefully and hygienically according to current legislation. For further advice, contact your Local Authority.

### Further information

- Contact Natural England's Wildlife Management Advisors for more information and advice on site assessment and monitoring of rat numbers.

## References

- Chartered Institute of Environmental Health (2014) *Code of practice for the use of vertebrate traps*. <https://www.urbanpestsbook.com/download/code-practice-use-vertebrate-traps/>. CIEH, London, UK.
- Defra (2009) *Code of Practice for the prevention and control of rodent infestations on poultry farms*. <http://webarchive.nationalarchives.gov.uk/20130402151656/http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/zoonoses/documents/reports/salrodent.pdf>. Defra.
- HGCA (Home-Grown Cereals Authority) (2012) *Rodent control in agriculture – an HGCA guide*. Second edition. HGCA and Agriculture and Horticulture Development Board.
- Mason G & Littin K. (2003) The humaneness of rodent pest control. *Animal Welfare*, **12**:1-37.
- McLeod L, Saunders G and Sharp T (2011) Trapping of rodents. Standard Operating Procedure ROD003. NSW Department of Primary Industries.



- Massei, G., Quay, R.J., Gurney, J. & Cowan, D.P. (2010) Can translocations be used to mitigate human-wildlife conflicts? *Australian Journal of Wildlife Research*, **37**: 428-439.
- Natural England (2012) *Rats: options for controlling infestations. Technical Information Note TIN057*. Natural England.
- Universities Federation for Animal Welfare (2008) *Guiding principles in the Humane Control of Rats and Mice* (section 6.3.1. Live-capture traps and Box 2 Humane methods for killing live-trapped rats and mice). <https://www.ufaw.org.uk/rodent-welfare/rodent-welfare#options>  
UFAW.