

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 5:

Standard Operating Procedure UKRAT003: Glue 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. Glue traps (GTs) are one of several rat management methods with varying degrees of efficacy, including anti-coagulant poisons, spring traps, live cage-traps, cholecalciferol, non-toxic lethal feeds, shooting, gassing, electrocution 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.

The use of GTs for trapping rats is a controversial method and should only be used as a last resort. Trapped rats should be humanely killed and not left to die on the board. This Standard Operating Procedure (SOP) is for glue 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. Rats may be less trap-shy of GTs than snap traps because they have a lower profile, but it has been reported that they can jump over them.
- GTs (or 'sticky boards') are pieces of wood, plastic or stiff cardboard covered in viscous glue consisting of mineral oils, resins and synthetic rubber. Rats become stuck to the glue by the feet and fur, and immobilised, when they run over the traps. GTs are not intended to be killing traps and should be treated as live-capture devices; unless traps are checked frequently, and trapped rats are swiftly killed, they are likely to die on the trap. GTs are for indoor use and need to be used in dry and dust-free environments (plastic or cardboard tunnels are available to cover and protect the glue from dirt and dust). If they are transported in a car they should be stored in a coolbox.
- Only GTs intended for use with rats must be used with rats; rats may be able to drag attached mouse GTs away making it difficult to find and kill rats humanely.
- Because of concerns about rat welfare and non-target capture, GTs should only be used as a last resort, e.g., for controlling rats where there is an immediate risk to public health within high-risk environments when all other control methods are not viable or are considered to have failed. Detailed records must be kept to show why other methods were considered inappropriate or to have failed.
- Cited advantages of GTs are that: (1) they are non-toxic and non-contaminating; (2) they hold the carcass in one place; (3) they have a 100% capture rate for animals that

encounter them; (4) no licence is required for their use; (5) they are inexpensive; (6) they can provide proof of presence of an ongoing infestation and may allow estimation of the extent (unlike baiting methods). GTs are favoured in certain environments, e.g. food processing, and (because of their low profile) where traps need to be deployed in small spaces.

- Proper checking and humane killing of trapped rats are time-consuming and labour-intensive. In general, there is no legal requirement to check live capture traps 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 GTs, should be checked. Natural England recommends that cage traps for rats should be inspected twice a day, while The Universities Federation for Animal Welfare (UFAW) guidelines recommend that GTs are checked at least twice daily and the Pest Management Alliance (PMA) Glueboard Code of Practice (CoP) states that GTs should be checked at a minimum of every 12 hours.
- Dealing with live-trapped rats is challenging. GTs should be used only by operators with adequate training and who are competent in the effective and humane use of this technique. Humane use of GTs is the legal responsibility of the pest controller and cannot be delegated to untrained people. Killing glue trapped rats is likely to be beyond the experience and ability of many people and repeated killing (as done by pest control operators) can cause emotional distress over time.
- Humane killing of glue 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 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 reasonably 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 unnecessary pain, suffering, injury and disease.

- GTs are associated with significant welfare concerns and have been banned in the Republic of Ireland, New Zealand and India, and their use is prohibited or restricted in some Australian States. Some US companies and government departments have voluntarily banned the use of GTs.
- A key welfare concern with glue trapping is whether rats are simply left to die on glueboards and, if not, the length of time a rat remains trapped before it is discovered. Trapped animals are at risk of exposure, dehydration, starvation, exhaustion, shock, capture myopathy and predation or cannibalism.
- Rats trapped on GTs are also at risk of suffering pain and distress through being trapped, the physical effects of the glue on functioning (e.g. suffocation), and trauma resulting from panic and escape attempts (e.g. hair being pulled out, skin torn and limbs broken), or from predator or conspecific attack. Some animals are reported to have chewed through their own limbs in an effort to escape. After a few hours, they may be covered in their own faeces and urine. GTs need to be checked regularly.
- Another major concern related to glue trapping is whether trapped rats are swiftly and humanely killed. The killing method recommended by the Pest Management Alliance is a strong and accurate blow to the head with a suitable implement. Drowning is not an appropriate method. Killing rats is likely to be beyond the experience and ability of many people and repeated killing (as done by pest operators) can cause emotional distress over time.
- Rats must not be trapped using GTs intended for mice as these are smaller in size and there is a risk that trapped rats will escape, with a mouse GT attached, to die a slow and distressing death.

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.
- GTs are not target specific so must be positioned to avoid risk to non-target animals.
- If a non-target animal becomes trapped and is still alive, and it can be seen immediately that it has injuries that would be untreatable or which would compromise its survival in the wild, it should be humanely killed (while still attached to the trap) using a technique suitable for the species. Otherwise, live-trapped non-target individuals should be freed from the GT by massaging affected areas with a suitable (and warmed) food grade oil or similar emollient.

- Animals freed successfully from GTs must be kept in a warm, dark and quiet holding area, ideally until a vet is available, when the animal should receive treatment for being “oiled,” as oil affects an animal’s ability to regulate its body temperature. If a vet is not available, the animal should be examined for injuries and signs of illness or distress, assessed for suitability for release. If the animal appears uninjured and has suffered only minimal oiling – and appears well enough - it may be released (provided it can be released legally) at the site of capture. Otherwise, it 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 must not be released, and should either be humanely killed using a suitable method, or taken to an animal shelter.
- If a rat trapped on a GT is eaten by a predator, the predator’s mouth could potentially become stuck together but otherwise there is no secondary threat to the predator (unlike 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

Glue traps

- Rat GTs (of a colour that blends well with the site background).

Other equipment

- Personal protective equipment including waterproof gloves.
- Food grade oil or other suitable emollient for releasing non-target captures.
- Heavy metal or heavy wooden blunt implement for killing trapped rats.
- Waterproof bag for carrying used GTs and 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 GTs

- Wear gloves for operator protection and to help mask human odours.
- GTs are deployed indoors. Existing food sources should be left undisturbed.
- Careful placement of GTs is crucial to maximise effectiveness. GTs should be placed in areas of obvious rodent activity, such as on runs or near active nests or droppings.
- GTs are for indoor use and should be positioned so as to avoid risk to non-target species.
- Care should be taken to ensure there is no oil or dust on either the GTs, or the floor, as these may prevent rats' feet from becoming stuck to the glue.
- Position GTs on rat runs and other rat movement areas as estimated from the survey, ideally alongside a wall or similar linear feature. Set the GT firmly in position and flush with the ground. Do not set GTs 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 on GTs.

- Keep detailed records of the number of GTs set and plans of where they are positioned. Keep these up to date for traceability.
- GTs should be checked within 12 hours, with inspection times arranged to minimise the time rodents are likely to be on GTs. Trapped rats must be killed humanely and as soon as possible after capture.
- Continue using GTs until rat activity in the area ceases. Consider moving GTs every two weeks if 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

- Glue 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 to the trapped rat.
- Kill the trapped rat swiftly, while it is still attached to the trap. Strike the back of the rat's 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, while still attached to traps, and according to current legislation, to avoid the trap becoming a non-target risk for animals that might try to remove the dead rat from the trap. For further advice, contact your Local Authority.

Disposal of used GTs

- At the end of treatment collect and account for all GTs that were deployed.
- Cover sticky surfaces to avoid accidental trapping of non-target animal or subsequent misuse.
- Dispose of GTs carefully in accordance with advice from 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*. CIEH, London, UK.

http://www.cieh.org/Code_of_practice_for_the_use_of Vertebrate_traps.html.

Cowan P & Brown S (2015) *A review of rodent monitoring and control methods as alternatives to glueboard traps; final report: Ministry of Primary Industries Technical/Information Paper No: 2015/15*. www.agriculture.govt.nz. Ministry of Primary Industries, Wellington, New Zealand.

Defra (2009) *Code of Practice for the prevention and control of rodent infestations on poultry farms*. Defra.

<http://adlib.everysite.co.uk/adlib/defra/content.aspx?id=000HK277ZW.09IRTYFX9O213FR>

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.

Natural England (2012) *Rats: options for controlling infestations. Technical Information Note TIN057*. Natural England.

Pest Management Alliance (2017) *Code of Best Practice: Humane Use of Rodent Glue Boards*. Pest Management Alliance. <https://www.pmalliance.org.uk/codes-of-best-practice/>.

Universities Federation for Animal Welfare (2008) *Guiding principles in the Humane Control of Rats and Mice* (section 6.3.3. Glueboards and Box 2 Humane methods for killing live-trapped rats and mice). UFAW. <https://www.ufaw.org.uk/rodent-welfare/rodent-welfare#options>.