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

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Online Resource 3:

Standard Operating Procedure UKRAT001: Spring trapping rats

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. Spring trapping is one of several rat management methods with various degrees of efficacy, others including anti-coagulant poisons, live cage-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.

Spring traps are designed to kill rats by striking them on the head, neck or spinal column or by constriction of the thorax. A wide range of approved metal spring traps are available for killing rats, as well as snap traps (STs), also known as break-back traps, which do not currently require approval in the UK. This Standard Operating Procedure (SOP) is for lethal spring trapping of rats. 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. Pre-baiting/baiting can be used to help overcome wariness.

• The term ‘spring trap’ generally applies to a trap that uses the power of a spring to strike and hold the target animal on a part of the body with sufficient force to kill it. Spring traps are designed to kill target animals by crushing vital organs. They aim to do this by either delivering a sharp blow to the head, neck or spinal column or by constriction of the thorax. Spring traps for rats include STs; these have a flat treadle or bait pan, which releases a metal loop/striking bar or plastic jaws to close down on the target, the aim being to crush the back of the skull or upper cervical vertebrae.

• Spring 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. Large numbers of traps are usually needed and their deployment, checking, re-siting and setting are time-consuming and labour-intensive, but digital trap monitoring systems are available to make the process more efficient.

• Spring trapping is often used on small-scale applications, such as by members of the public for killing rats in and around their homes. Unlike using poisons and fumigants, trapping has the advantage of retaining the carcases (allowing simultaneous monitoring of rat numbers), preventing them from decomposing out of sight (and causing unpleasant smells) and reducing safety risks to humans and other animals.

• Spring traps approved in the UK for killing rats include certain BMI Magnum, DOC, Fenn, Kania, KORO, Solway, Springer, Tully and WCS Tube Traps. Metal spring traps tend to be used outdoors, in farm environments, and by pest controllers.
• A wide variety of unregulated STs constructed of wood/metal and or plastic are also available; these have blanket approval without requirement for testing. STs tend to be used indoors, by members of the public in domestic settings, on commercial premises, and by pest controllers.
• Regulated spring traps must be set in an appropriate tunnel to reduce the chance of attracting or killing non-target animals, but without impeding the action of the trap, e.g., in the case of rats, in a sewer, drainpipe, or similar structure. This is a requirement of the Spring Traps Approval (England) Order 2018 and its analogues for Wales, Scotland and Northern Ireland. STs must also be set in tunnels if used outdoors or elsewhere where non-target species may be at risk of capture or injury. They may be supplied, or placed, in secure boxes to prevent children or pets from being injured. Traps must be used according to manufacturer's instructions.
• There is no legal requirement to check rat spring traps in the UK. Both Defra and Natural England recommend that spring traps for rats are checked at least once a day but the Universities Federation for Animal Welfare (UFAW) guidelines recommend that they are checked at least twice daily.
• 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

• The Pests Act 1954 made it an offence, in England, Wales and Scotland, to use a spring trap for killing or taking animals, other than one approved by an Order of the Secretary of State. Some rat spring traps require this approval but rat STs are exempt under The Pests Act 1954, as implemented by The Small Ground Vermin Traps Order 1958.
• Animal welfare can be compromised up to the point when the animal becomes irreversibly unconscious. Traps which do require approval are approved if ≥80% of twelve tests cause irreversible unconsciousness in the target animal within 5 minutes. Significantly shorter times to irreversible unconsciousness have been proposed by NoCheRo under a voluntary ST certification scheme being considered by the European Commission. However because STs do

not require approval, data on the time to irreversible unconsciousness are not in the public domain.

• The impact momentum and clamping force produced by rat STs, both of which influence the damage inflicted and thus the associated welfare impacts, have been shown to vary several-fold among different types of trap, indicating that welfare performance may be equally variable. STs with larger opening angles and double-peg springs may be more powerful and would be recommended over other types as they may be more likely to create tissue damage sufficient to cause rapid loss of consciousness; traps with a strong striking bar and a larger treadle are also recommended.

• An effective trap will fracture the cranium or upper cervical vertebrae, causing unconsciousness immediately or rapidly, followed by death. If a trap strikes a sub-optimal body location, and/or strikes with insufficient force, a trapped animal is likely to suffer injuries that result in a slower death.

• 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 to not 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. Because a trapped rat may not necessarily be killed quickly (for example if it is caught by a limb), traps need to be visited regularly.

• Trapped animals that are not killed immediately by the trap action are at risk of exposure, dehydration, starvation, shock, capture myopathy and predation. Animals that are not killed by the trap action can be severely injured by the trap or when trying to escape.

• Any trapped rats found alive should be humanely killed as soon as possible.

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.

• If performed correctly, spring trapping is relatively safe for non-target species, users and other people. Where there is risk of non-target capture, placing traps inside tunnels or boxes, can help to minimise these risks.

• Livestock and pets should be excluded from any area where traps are set.

• Live non-target animals, such as birds, cats or dogs, caught in traps must be examined for injuries and signs of illness or distress and treated as follows:

- Animals which are unharmed or have only received minimal injuries such as minor cuts or abrasions should be immediately released at the capture site (provided they can be released legally, e.g. are not on Schedule 9 of the Wildlife and Countryside Act 1981).
- Animals which have more severe, untreatable injuries or injuries that would compromise their survival in the wild, and animals suffering from thermal stress, hunger or dehydration, should either be humanely killed (unless protected) using a technique appropriate for the species 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.

• 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.

• If a spring-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.

• Operators should be wary of the risks of injury when placing and setting traps. Wear waterproof gloves for protection from contamination. Wearing gloves may also prevent injuries from trap jaws but may hinder trap-setting.

• Operators should be protected by tetanus immunisation in case of infection of scratches/bites.

Equipment Required

Spring traps

• Rat spring traps. These should be well-maintained, not rusty and should operate smoothly and swiftly when triggered.

• Suitable tunnels or boxes for protecting non-target animals from potential injury (these are supplied with some traps). These are not required for STs in an enclosed space where there is no risk to non-target animals.

Other Equipment

• Personal protective equipment including waterproof gloves.

• Pliers for adjusting traps.

• Trowel (when setting traps outdoors).

• Pegs for tethering (when setting chained traps outdoors).

• Heavy metal or heavy wooden blunt implement for killing any rats found alive in traps.

• Waterproof bag for carrying rat carcases.

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.

• Traps are deployed (in boxes or tunnels where needed) and set straight away; traps are not baited though many STs come pre-treated with a lure. Existing food sources should be left undisturbed.

• De-grease and weather any new traps to get rid of any smell of oil, grease or humans.

• Careful placement of traps is crucial to maximise effectiveness. Traps should be placed in areas of obvious rodent activity, such as on runs or near active nests or droppings. Items, such as a board or a brick, may be used to direct rats towards traps.

• 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 pliers.

• Set traps on rat runs inside an appropriate natural or artificial tunnel or box depending on trap type. A tunnel or box may not be necessary where an assessment indicates that there is no risk to non-target species because of the location of the trap, e.g. inside an enclosed loft cavity.

• Position STs 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 trigger end almost touching the wall so the rat will pass over the trigger. Set the trap firmly in position with the treadle plate flush with the ground. Where possible, position traps amongst cover/behind boxes etc.

• Conceal the treadle plate with a light covering of soil/leaves if outside.

• The trap should be baited (using the same baits as used during pre-baiting, if traps were pre-baited).

• Where the trap is fitted with a chain, use this to secure the trap using a peg in the ground.

• Deploy plenty of traps (recommendations include ≥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 at least once a day, between sunrise and sunset, to reset any that are sprung, remove dead rats and humanely kill any trapped rats that may still be alive.

• 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 rats found alive in traps or dependent pups

• Any rats found alive in traps 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 additional 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 carcase.

• 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 carcases

• Rats can carry infections that are dangerous to humans and other animals. Carcases 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

Baker, S.E., Ellwood, S.A., Tagarielli, V.L. and Macdonald, D.W. (2012) Mechanical Performance of Rat, Mouse and Mole Spring Traps, and Possible Implications for Welfare Performance. *PLoS ONE*, 7 (6): e39334. doi:10.1371/journal.pone.0039334. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0039334

Chartered Institute of Environmental Health (2014) Code of practice for the use of vertebrate traps. http://www.cieh.org/Code_of_practice_for_the_use_of_vertebrate_traps.html. 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.

Natural England (2012) *Rats: control on livestock units*. Technical Information Note TIN058. Natural England.

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

Parrott, D.; Quy, R.; Van Driel, K.; Lurz, P.; Rushton, S.; Gurnell, J.; Aebischer, N.; Reynolds, J. Review of red squirrel conservation activity in northern England. A Report by Fera to Natural England (NECR019); Natural England: Sheffield, UK, 2009.

Schlötelburg A, Geduhn A, Schmolz E, Friesen A, Baker S, Martenson N, Le Laidier G, Urzinger M, Klute O, Schröer D, Brigham A, Puschmann M (2021) NoCheRo-Guidance for the Evaluation of Rodent Traps - Part A Break back/Snap traps. TEXTE 74/2021, ISSN 1862-4804. German Environment Agency, Germany. https://www.umweltbundesamt.de/publikationen/nochero-guidance-for-the-evaluation-of-rodent-traps.

Universities Federation for Animal Welfare (2008) Guiding principles in the Humane Control of Rats and Mice (Section 6.3.2 Spring-powered killing traps). https://www.ufaw.org.uk/rodent-welfare/rodent-welfare#options. UFAW.