RSPCA ANIMALS IN SCIENCE

Cage cleaning: mice and rats

Aim of this resource

To help AWERBs discuss local practice for cage cleaning.

Relevant AWERB task

Advising staff on animal welfare and the application of the 3Rs.

Recommendation

Include cage cleaning as an agenda item, using this information to stimulate discussion.



The issue

Cage cleaning is necessary for good animal health and hygiene. However, the process can cause distress to mice and rats - which can affect both animal welfare and data quality.

Cage cleaning disrupts scent marks.
The sense of smell is very important to rodents. Smells provide important social information such as age, rank, sexual status and each individual's family group. When cages are cleaned, structures such as nests and latrine areas are destroyed, and the animals' scent marks are removed.

Cage cleaning involves handling the animals and moving their cages.
This causes stress responses which significantly affect animal behaviour and physiology for several hours following cage cleaning.

Key points:

- Allow mice and rats at least two hours recovery after cage cleaning before any scientific data are collected.
- Consider spot cleaning mouse cages to reduce disturbance.
- When cleaning mouse cages, transfer some nesting material from the soiled cage into the clean cage.
- Do not transfer litter (such as sawdust) from the soiled cage.
- Monitor post-cleaning aggression in group housed male mice.
- Wash hands or change gloves between changing the cages of different strains or species.
- Retaining the same cage lid or enrichment item across cage-changes may benet rats.
- Make sure that animals are handled competently and sympathetically.
- Avoid disinfectants and sanitisers that may harm rodent health and welfare.
- Minimise noise throughout the process.
- For non-breeding animals, clean cages as often as necessary to maintain a healthy environment and prevent levels of ammonia and micro-organisms from becoming harmful or unpleasant.
- Where possible, try to conduct husbandry procedures like cleaning at times of day when animals will be active.

Special considerations for breeding animals:

- Minimise the transfer of odours between cages containing different individuals when cleaning breeding rats.
- Avoid cleaning the cages of mice or rats during the last third of pregnancy or up to the rst two to three days following birth.
- Review your establishment's cage cleaning frequency for breeding animals.

Thanks to Dr Charlotte Burn, RVC, for her assistance with this sheet.

Background Information:

- **Allow mice and rats to recover for at least two hours after cage cleaning before any scientific data is collected – and preferably do not use them for data collection until the following day.** Handling the animals causes stress responses which can significantly affect their physiology and behaviour for several hours [1] or even days [2] following cage cleaning.
- **Consider spot cleaning mouse cages to reduce disturbance**. This has been found to significantly reduce aggression compared with weekly or fortnightly full cage changes [3].
- **When cleaning mouse cages, transfer some dry nesting material from the soiled cage into the clean cage.** Used nesting material contains aggression-inhibiting hormones, e.g. those secreted by the plantar glands in the foot pads. Male mice, for example, were found to be less aggressive after cage cleaning when some nesting material was transferred from the soiled cage into the cleaned cage [4]. However, a nest box should also be provided to reduce aggression in the longer term [5].
- **Do not transfer litter (such as sawdust) from the soiled cage.** Mice and rats urinate in the cage litter, and their urine contains hormones that can increase aggression - this is especially important in mice [4].
- **Take extra care with monitoring post-cleaning aggression in group housed male mice.** Cage cleaning can cause short-term increases in aggression in any group but especially in male mice, so extra monitoring is advisable in the immediate post-cleaning period [4].
- **Wash hands or change gloves between changing the cages of different strains, species, or sexes.** Male mice may be more aggressive if handled using gloves carrying the scent of females [6] or males of a different strain (p.74 in [7]). Cages of male mice should be cleaned before those housing female mice. Mice and rats are also fearful of predator odours (e.g. from ferrets), and mice may be fearful of rat odour [8,9].
- **Retaining the same cage lid or enrichment item across cage-changes may benet rats.** This can reduce the cardiovascular response to cage cleaning compared with an entirely new cage [10]. However, transfer of soiled bedding/nesting material seems not to benet rats, because studies have shown that rats do not appear to have a strong preference for their own scent marks over clean areas [11].
- **Make sure that animals are handled competently and sympathetically.** Training in animal handling should help to ensure that all staff know how to catch and handle animals with care, minimising any distress. Catching mice by the base of the tail induces aversion and anxiety; handling can be rened by scooping them up in the open hand, or by using 'handling tunnels' [12]. Consider using positive reinforcement techniques to train animals to voluntarily change cages (e.g. clicker training [13]) to minimise manual handling and stress to the animal.
- **Avoid disinfectants and sanitisers that may harm rodent health and welfare.** Cleaning hands or gloves with alcohol-based sanitiser just before handling mice can cause avoidance and defensive behaviour, and the sanitiser can be ingested during grooming [1,8]. Little research has been conducted on specific detergent effects on rodent health and welfare, but some have been found to disrupt rodent fertility [14]. These are not commonly used in the UK [15], but effects of cleaning products should be monitored where possible.

- **Minimise noise throughout the process**. Noise can be minimised by using polycarbonate instead of metal cages and by calm, unhurried working when cleaning cages [1].
- **For non-breeding animals, clean cages as often as necessary to maintain a healthy environment and prevent levels of ammonia and micro-organisms from becoming harmful or unpleasant.** There is currently insufficient evidence to make any recommendations on the optimum cage cleaning frequency for rat or mouse welfare. For example, there are no clear effects of cleaning frequency on the welfare of non-breeding rats housed in stable groups [11]. There are some changes in behaviour after cage cleaning in non-breeding mice and rats, but these are short-lasting and indicate wakefulness rather than obviously good or poor welfare - so this should not affect decisions on cleaning frequency unless clear effects on welfare are observed [4,6,16]. The optimum frequency will depend on several factors including ventilation rates (which vary with caging type), the number of animals in each cage and the type of litter and nesting material provided.
- **Where possible, try to conduct husbandry procedures like cleaning at times of day when animals will be active**. Rats and mice are predominantly nocturnal, and there is evidence that welfare is affected when they are disturbed during the human working day (when they would be resting). Research has shown that rats whose cages were cleaned during their active phase – under a reversed light cycle routine, using dim red light – showed fewer signs of stress than those who were exposed to cleaning during their resting phase [17]. Mice are less sensitive to red light than humans are, but they can perceive it – the long-term effects of its use compared with darkness are not yet known [18].
- **Minimise the transfer of odours between cages containing different individuals when cleaning breeding rats.** This will reduce the risk of cannibalism and premature parturition [19].
- **Avoid cleaning the cages of mice or rats during the last third of pregnancy or up to the rst two to three days following birth.** Animals are especially sensitive to disturbance at these times and cannibalism in breeding rats is especially likely if pups are under two days old at rst cleaning [19]. This may require using adequate quantities of an absorbent, low-ammonia bedding material, such as compressed paper bedding, to avoid compromising hygiene [20].
- **Review your establishment's cage cleaning frequency for breeding animals.** Mouse pup mortality is greater when they are cleaned out every 7 days and less when cages are cleaned every 14 days [19,21]. If breeding mice are cleaned out weekly, consider whether this is necessary. Some stocks of rats and mice are less sensitive than others: in one study, rat and mouse breeding performance was similar when cleaned weekly versus waiting until the following week to clean if new pups were present [22].

For a full list of references click here.