**Purpose:**

This guideline is implemented to ensure the highest quality of animal health by use of environmental enrichment in a manner that complies with all current laws, regulations, and guidelines via good laboratory animal practices, IACUC oversight, and Attending Veterinarian advice and participation.

**Scope:**

This guideline applies to all Texas A&M University-Commerce (A&M-Commerce) students, faculty and staff, visiting students, faculty and staff. Investigators may opt out of some or all of the practices described herein if appropriate reason is given and approved by the Attending Veterinarian.

**Materials:**

- PVC tubes
- Nesting material
- Forage material
- Shelter
- Nylabones
- Dietary supplements
- Running wheels
- Hard wood blocks
- Exercise enclosures

**Responsibilities:**

Appropriately trained staff members are expected to monitor animals in accordance with this guideline. Animal care staff will conduct routine health surveillance and any concerns will be reported to the Attending Veterinarian immediately.

**Procedures:**

1) Social Contact: Murid rodents are naturally social animals. Pair or group house mice or rats to maximize species-specific behaviors while minimizing stress-induced behaviors. Do not crowd.
   a) Rodents may be singly housed in some cases:
      i) Incompatibility (e.g., aggression in mature males)
ii) Medical reasons
iii) Pregnant females if prone to cannibalism
iv) Specific protocol approved by the IACUC

b) Housing system:
i) Animals should be housed in solid-bottom cages with contact bedding, unless specifically described in a protocol approved by the IACUC
ii) Cages must be appropriate in size for the number of rodents housed in them, as described in the Guide for the Care and Use of Laboratory Animals.

c) Implementation: Socially housed animals should be kept with familiar cage mates, especially siblings. New introductions should be made in newly cleaned cages and supervised for signs of aggression, which may require separation. Singly housed animals require additional enrichment to compensate for lack of social interaction with conspecífics.

2) Dietary Enrichment: Provide rodents with materials to stimulate natural foraging behaviors and appetite. All materials must be approved by the AV as safe for the group of rodents in question.

a) Edible materials may include the following:
i) Prepared rodent or bird “treat” diet (seeds, pellets, dried fruit, etc.)
ii) Fresh fruit or vegetables cut into small pieces (carrots, apples, etc.)
iii) Specifically allowed human” food items (yogurt, banana chips, dried cereals, etc.)

b) Non-edible materials can stimulate gnawing and proper tooth health, while reducing abnormal behaviors such as bar and cage gnawing. Such items may include:
i) “Nylabone” type chews (especially for rats)
ii) Prepared wood blocks (often food-scented)

Implementation: Dietary enrichment should be introduced when cages are cleaned. An amount appropriate for the number of animals should be scattered through the cage to stimulate foraging without aggression over a limited resource.

3) Object Enrichment & Exercise: Provide rodents with inanimate objects that can be manipulated and/or stimulate natural non-feeding behaviors.

a) Nesting material: Some amount of nest material should be transferred with the animals during cage changes. Provide species-appropriate nesting material for each cage, such as:
i) “Nestlets” shred-able cotton pads
ii) Shredded or crinkled paper
iii) Aspen shavings

b) Shelters: Appropriately sized and safe shelters should be provided for each cage. Be sure they do not occlude access to food or water. These could be:
i) PVC tube sections
ii) Chew-resistant plastic shaped shelters
iii) Cellulose/cardboard boxes or tubes

c) Exercise: rodent activity levels may be increased by several means:
i) Exercise wheels of appropriate size for animal (must fit inside cage)
ii) Exercise balls (may be used in a safe area with supervision)
iii) Exercise cage: a larger enclosure that animals may have access to on a controlled schedule. Must be sanitized between uses.

d) Implementation:
i) Nesting material should be freshened at cage changes. Some amount of nest may be transferred to the clean cage, if not excessively soiled, to maintain familiar odor cues and
reduce stress. Nesting material should always be available to solitary animals, young animals, and breeding females.

ii) Shelters that are chew-able should be treated as nesting material (above), while permanent structures should be replaced and cleaned/disinfected regularly.

iii) Exercise opportunities depend on species and space constraints. Mice in large enough containers may have exercise wheels, or means to engage in climbing in their home cage. Rats benefit more from environmental complexity than exercise, so may spend time in a multi-level cage for several hours every two weeks (if available), or have complex shelter in larger home cages.

4) Handling & Cognitive Enrichment: Cognitive stimulation and contact with human handlers can have an enriching effect, reducing stress and stereotypic behaviors. This can take various forms:
  a) Handling by caretakers: simple gentle handling can habituate animals to procedures and have a calming effect. Singly housed animals, such as mature male rats, benefit from handling to reduce effects of isolation from conspecifics.
  b) Training: Cognitive stimulation in the form of simple training (approach, take treat, hop to new cage, etc.) can both make general caretaking safer and quicker, while providing a rewarding activity for the animal.
  c) Habituation to Common Procedures: This has the double benefit of the effect of training, and reducing the stress of common procedures by repetition.
  d) Implementation: Handling and training should be frequent events. Simple handling of each animal should occur at least weekly, and more often for solitary animals and rats. Training events should occur at any interaction, especially in preparation for any upcoming procedures.

5) Implementation Schedule, Species, and Variation: Enrichment should be provided on a regular schedule, with changes generally implemented when cages are cleaned. Details are noted in each section above.
  a) Species consideration: Many of the above enrichments can be appropriate for either mice or rats, but there are different optimal approaches. Mice benefit most clearly when offered nesting material and foraging enrichment, while rats prefer gnawing materials and environmental complexity, as well as benefiting more from handling.
  b) Individual variation: Always take individual variation in preferences into account. Observe each animal with any new enrichment type to assure safe and appropriate interaction.

Personnel Safety

1. For human medical emergencies: Call 911
2. For questions regarding handling of chemicals, contact the A&M-Commerce Environmental Health & Safety Office or refer to the Chemical Hygiene Plan on the website.
3. When working with animals, wear appropriate PPE, observe proper hygiene, and be aware of allergy, zoonosis, and injury risks. Refer to the A&M-Commerce Occupational Health and Safety webpage for more information.
Animal Related Contingencies

4. Contact information for emergency assistance will be posted in a conspicuous location within the Animal Care Facilities.

5. Veterinary Care
   
   Emergency veterinary care and advice is available at all times including after working hours and on weekends and holidays:

   **Always contact Dr Taylor (AV) first** at 214.532.3420

6. Biomedical Settings: phone Dr. Taylor 214.532.3420

References


Authors: Lani Lyman-Henley, Petra Collyer

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