



IACUC Guidance:	<b>TAMU-G-027</b>	Title:	<b>IACUC Guidelines on Environmental Enrichment, Single Housing of Social, Biomedical Species Housed Indoors</b>
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	Location	Effective Date	Review By
	<b>College Station/Dallas/Galveston/Kingsville</b>	10/20/2022	04/30/2025
	<b>Houston</b>	06/01/2022	04/30/2025

**1. PURPOSE**

- 1.1. The primary aim of environmental enrichment is to enhance animal well-being by providing animals with sensory and motor stimulation, through structures and resources that facilitate the expression of species-specific behaviors and promote psychological well-being through physical exercise, manipulative activities, and cognitive challenges according to species-specific characteristics.
- 1.2. Federal animal welfare regulations also provide specific requirements to meet the enrichment and exercise requirements for non-human primates and dogs, respectively.
- 1.3. The purpose of this guidance is to define environmental considerations for singly housed social species of research animals at Texas A&M University.

**2. SCOPE**

- 2.1. Applies to indoor-housed biomedical species; excludes agricultural animals covered by the Ag Guide and biomedical animals housed outdoors.
- 2.2. Social housing and environmental enrichment is addressed at the level of the individual housing area due to the size and scope of the program at Texas A&M University.
- 2.3. Social housing will be considered by the IACUC as the default method of housing.

**3. RESPONSIBILITY**

- 3.1. Enrichment SOPs established by housing facilities/vivaria/PI must be in accordance with the Guide or Ag Guide.
- 3.2. PI satellite locations must describe enrichment plans in the approved protocol.
- 3.3. The PI will provide scientific justification in the approved protocol for any social species that cannot be socially housed or enriched.
- 3.4. The IACUC oversees social housing and environmental enrichment of all animals owned by the university and retains the authority to review and approve acceptable deviations in the animal use protocol.

**4. DEFINITIONS AND/OR ACRONYMS**

- 4.1. **AUP:** Animal use protocol. Document submitted by the PI indicating the housing and procedures involving animals.
- 4.2. **AV:** Attending Veterinarian. Individual designated by Texas A&M University to fulfill the regulatory role of AV. May also describe veterinary staff who report directly to, and have delegated authority from, the AV.
- 4.3. **Conspecifics:** Animals of the same species.
- 4.4. **Environmental Enrichment:** The deliberate, variable, and scheduled additions to an animal's environment with which it can interact. The goal is to allow animals to express a range of species-typical behaviors which may enhance their well-being.
- 4.5. **IACUC:** The Institutional Animal Care and Use Committee. Institutional body responsible for ensuring adherence to federal regulation and institutional policy relating to the care and use of animals in teaching, testing and research. Appointed by the Institutional Official.
- 4.6. **Post-Operative Period:** The 7-10 days following the initial day of surgery.
- 4.7. **PI:** Principal Investigator. The individual who has ultimate administrative and programmatic responsibility for the design, execution, and management of a project utilizing vertebrate animals.



- 4.8. **Single Housing:** Maintaining an animal in a primary enclosure by itself with additional visual, auditory, olfactory, and/or tactile contact of conspecifics housed within the same area.
- 4.9. **Social Enrichment:** Appropriate social interactions among conspecifics, which are essential to normal development and well-being.
- 4.10. **Social species:** any species known to naturally live and interact with conspecifics. The majority of research animals are considered social species, including but not limited to the following: most rodents (mice, rats, guinea pigs), rabbits, ferrets, cats, dogs, sheep, goats, pigs, nonhuman primates, and aquatics (frogs and fish).
- 4.11. **Solitary Housing:** housing an animal in a primary enclosure alone in the absence of any other animals within visual and scent range.
- 4.12. **SOP:** Standard Operating Procedure
- 4.13. **Standard housing:** The type(s) of housing approved by IACUC and provided by CMP/ARU/PAR/PRF, and other campus vivaria, for general use (varies by species).
- 4.14. **Standard housing (Ag Species):** The type(s) of housing approved by the IACUC and provided by campus animal facilities, for general use (varies by species).
- 4.15. **USDA:** United States Department of Agriculture. USDA Animal Care, a unit under the Animal and Plant Health Inspection Service, administers the Animal Welfare Act (AWA) and associated Animal Welfare Act Regulations (AWAR).
- 4.16. **USDA Regulated:** Species or activities which fall under the AWA/AWAR.

**5. GUIDELINES OR PROCEDURE**

**5.1. Environmental Enrichment**

- 5.1.1. To provide for the physical and social needs of research animals, the IACUC requires that appropriate environmental enrichment be provided as part of standard animal housing unless there is scientific justification, approved by the IACUC, that precludes the use of environmental enrichment materials or practices.
  - 5.1.1.1. For USDA-covered species, a written record of the environmental enrichment items provided will be kept along with the daily husbandry records.
  - 5.1.1.2. Scientific justification for the lack of environmental enrichment must be described in the approved AUP.
- 5.1.2. The appropriateness of specific environmental enrichment is determined by the species used, type of housing, space available, research needs, standard husbandry practices and other operational issues. Examples of appropriate species-specific environmental enrichment are included in the Table below.

SPECIES	ENVIRONMENTAL ENRICHMENT
<b>ALL SPECIES</b>	<ul style="list-style-type: none"> <li>• <b>Group-housed*</b> if compatible to provide social enrichment - minimum acceptable environmental enrichment. Should be augmented where possible with additional modalities.</li> <li>• Additional enrichment items or devices not listed below may be used if non-toxic/harmful, disposable or sanitizable, described in the literature, or approved in consultation with the Attending Veterinarian or designee.</li> <li>• Single housing of social animals should be limited to the minimum period required and provide a combination of visual, auditory, olfactory, or tactile contact of conspecifics, when possible.               <ul style="list-style-type: none"> <li>▪ Additional enrichment should be provided for singly housed animals unless exempted for scientific or veterinary reasons.</li> </ul> </li> </ul>
<b>MICE</b>	<ul style="list-style-type: none"> <li>• Nesting material made from paper or cotton fibers (e.g. Nestlets)</li> <li>• Disposable cardboard mouse houses ("Shepherd Shacks")</li> <li>• Plastic mouse houses (must be cage-washer safe)</li> <li>• Plastic loft or mouse hut for Lab Products® cages without a wire bar</li> </ul>
<b>RATS</b>	<ul style="list-style-type: none"> <li>• Nesting material</li> </ul>

	<ul style="list-style-type: none"> <li>• Plastic rat "houses" or tubes</li> <li>• Sterilized wooden tongue depressors for chewing</li> <li>• Sterilized Nyla bones for chewing</li> <li>• <b>Rat tickling*</b>, designed to mimic the play of juvenile rats</li> </ul>
<b>RABBITS</b>	<ul style="list-style-type: none"> <li>• Sanitizable toys such as plastic chains or balls, stainless steel rings, PVC pipe; rotated weekly</li> <li>• Small portions of timothy hay, other grass hay, alfalfa hay, fresh spinach or fresh kale offered one to three times per week in a sanitizable feeder, or on cage bottom</li> <li>• Small amounts of other fresh vegetables such as carrots and Romaine lettuce</li> <li>• Small amounts of dried banana chips apples or pineapple</li> <li>• <b>Positive human interaction*</b></li> </ul>
<b>PIGS</b>	<ul style="list-style-type: none"> <li>• <b>Group-housed*</b> if pen size is adequate and if animals arrive together</li> <li>• <b>Social contact*</b> with other pigs if possible</li> <li>• Sanitizable toys (e.g. Kong(R) toys, plastic balls)</li> <li>• Small amounts of food treats such as fresh vegetables, yogurt or fruit, including hidden food treats</li> <li>• <b>Positive human interaction*</b> (e.g. scratching back) if pigs are acclimatized to this</li> <li>• <b>A warm, artificial udder*</b> with flexible nipples can decrease distress in piglets that must be weaned at an early age for experimental reasons.</li> <li>• Opportunities to forage, explore, nest-build, play</li> <li>• Cognitive and/or manipulative activities</li> <li>• Access to soil, straw, peat, mushroom compost, hay, bark, branches, logs</li> <li>• Novel, sanitizable (hanging) objects</li> <li>• Increased space or appropriate subdivision of enclosure area</li> <li>• Multi-level pen</li> <li>• Good quality, well-managed bedding</li> <li>• Artificial lying mats</li> <li>• Snout coolers, or snout-operated showers</li> </ul>
<b>CATS</b>	<ul style="list-style-type: none"> <li>• <b>Positive human interaction daily*</b> (e.g. patting, scratching, rubbing back)</li> <li>• Multi-level shelves for resting and climbing</li> <li>• Sanitizable or washable toys and items such as scratching posts, toy mice and balls</li> <li>• Sanitizable treat dispensers</li> </ul>
<b>DOGS</b>	<ul style="list-style-type: none"> <li>• Sanitizable toys (e.g. Kong(R) toys, plastic balls)</li> <li>• <b>Positive human interaction*</b></li> <li>• Sanitizable treat dispensers</li> <li>• Playing music</li> <li>• Opportunity to exercise, as described in the exercise plan approved by the Attending Veterinarian</li> </ul>
<b>BIRDS</b>	<ul style="list-style-type: none"> <li>• Nesting structure and material specific to species</li> <li>• Perches of sanitizable or disposable materials, including natural branches</li> <li>• Sanitizable toys</li> <li>• Foraging devices and substrate</li> <li>• <b>Recorded vocalizations of same or similar species*, as appropriate</b></li> <li>• <b>Scent trails for scavengers and carnivores*</b></li> </ul>
<b>GUINEA PIGS</b>	<ul style="list-style-type: none"> <li>• Small quantities of Timothy or alfalfa hay 2 to 3 times per week</li> <li>• Plastic guinea pig houses (must be cage-washer safe)</li> <li>• Disposable cardboard guinea pig houses ("Shepherd Shacks")</li> <li>• Sanitizable toys such as balls or Kong toys</li> </ul>
<b>HAMSTERS</b>	<ul style="list-style-type: none"> <li>• Nesting material made from paper or cotton fibers</li> <li>• Disposable cardboard hamster houses ("Shepherd Shacks")</li> <li>• Plastic hamster houses (must be cage-washer safe)</li> </ul>
<b>GERBILS</b>	<ul style="list-style-type: none"> <li>• Nesting material made from paper or cotton fibers</li> </ul>

	<ul style="list-style-type: none"> <li>• Disposable cardboard gerbil houses ("Shepherd Shacks")</li> <li>• Plastic gerbil houses (must be cage-washer safe)</li> </ul>
<b>XENOPUS</b>	<ul style="list-style-type: none"> <li>• Shelter structures such as plastic guinea pig houses or large PVC pipes to allow frogs to hide</li> <li>• Small amounts of dietary supplements such as blood worms, chopped beef heart, and chopped liver</li> </ul>
<b>FISH</b>	<ul style="list-style-type: none"> <li>• Substrate</li> <li>• Sanitizable objects to provide hiding places (PVC pipe/tubing)</li> <li>• <b>Enclosure background image*</b></li> </ul>
<b>REPTILES</b>	<ul style="list-style-type: none"> <li>• Sanitizable objects to provide hiding places</li> <li>• Appropriate substrate</li> <li>• Levels within habitat (plants, rocks, etc)</li> <li>• Climbing structure, as appropriate</li> <li>• Enclosure background image</li> <li>• Provide live insect prey, or frozen rodents, as appropriate</li> <li>• Foraging opportunities (edible plants, vegetable/fruit)</li> <li>• <b>Human interaction*</b>, as appropriate</li> </ul>
<b>SHEEP/GOATS</b>	<ul style="list-style-type: none"> <li>• <b>Stainless steel mirrors*</b> can reduce but do not abolish the physiological stress response to social isolation in sheep <ul style="list-style-type: none"> <li>▪ <b>Note: a mirror image could cause social stress, if the reflection is considered a strange individual.</b></li> </ul> </li> <li>• It has been suggested that a mirror or an <b>inanimate object covered with animal skin*</b> could serve as a social surrogate.</li> <li>• Sanitizable feed dispensers</li> <li>• Hanging chains</li> <li>• Sanitizable toys</li> <li>• Playing music</li> <li>• Climbing structures (goats)</li> </ul>
<b>CATTLE</b>	<ul style="list-style-type: none"> <li>• Mechanical brushes</li> <li>• Opportunity to exercise</li> <li>• Sensory enrichment including quiet environments</li> <li>• <b>Interaction with gentle, confident handlers*</b></li> </ul>
<b>HORSES</b>	<ul style="list-style-type: none"> <li>• Sanitizable toys</li> <li>• Sanitizable treat dispensers (round or polyhedral designs are most effective)</li> <li>• Equine Appeasement Pheromone product is commercially available but there is minimal evidence of efficacy</li> <li>• Opportunity to forage</li> <li>• Horses bedded on straw perform less stereotypic behavior than on paper/shavings</li> <li>• <b>In horses with learned positive associations with humans*</b>, brushing or scratching the withers/neck region can mimic mutual grooming.</li> <li>• <b>Lateral visual contact with other equids, or mirrors, or life-sized poster images of a horse's face*</b></li> </ul>
<b>POULTRY</b>	<ul style="list-style-type: none"> <li>• Sanitizable Perches</li> <li>• Provide floor-housed chickens with cover</li> <li>• Sanitizable perches, other elevated surfaces</li> <li>• Sanitizable nestboxes</li> <li>• Substrate/ dustbath</li> <li>• Opportunities to forage</li> <li>• Swimming water (ducks)</li> <li>• Novel objects can be introduced but with caution to older birds</li> </ul>

	<ul style="list-style-type: none"> <li>• Bright, color, complex, moving video images</li> <li>• Possibly playing music, although data is lacking</li> <li>• <b><i>Socialization of poultry with humans can be carried out with relative ease by frequent exposure to kind, gentle care*</i></b></li> </ul>
<b>NONHUMAN PRIMATES</b>	<ul style="list-style-type: none"> <li>• Sanitizable toys</li> <li>• Sanitizable treat dispensers</li> <li>• Foraging behavior opportunities (provide fruits, vegetables, seeds, nuts)</li> <li>• <b><i>Stainless steel mirrors*</i></b></li> <li>• Water play</li> <li>• Playing music or movies, as recommended by a Nonhuman Primate Behaviorist</li> <li>• Slings or hammocks</li> <li>• Multi-level shelves for resting and climbing</li> <li>• <b><i>Daily human interaction*</i></b></li> </ul>
<b>*DENOTES EXAMPLES OF SOCIAL ENRICHMENT</b>	

**5.2. Social Experience**

- 5.2.1. Full time social housing is the preferred and expected method for housing social species.
- 5.2.2. Single housing of social animals should be limited to the minimum period required and provide a combination of visual, auditory, olfactory, or tactile contact of conspecifics, when possible.
  - 5.2.2.1. Part time access to conspecifics, where appropriate (e.g., overnight, when the animals are between studies, defined periods of time during the day, etc.)
  - 5.2.2.2. Protected contact that allows interaction of conspecifics through a mesh panel, grooming bars, or other type of perforated barrier.
  - 5.2.2.3. Positive interaction with animal care personnel.
  - 5.2.2.4. Requires responsible staff to be well-trained in the recognition and intervention of aggressive and associated behaviors.
  - 5.2.2.5. Additional enrichment should be provided for singly housed animals unless exempted for scientific or veterinary reasons, in the approved animal use protocol. See Table for examples.
  - 5.2.2.6. Investigators are highly encouraged to seek advice from ARU/CMP/PAR/PRF regarding enrichment strategy to plan for variability of individual animal response.
- 5.2.3. Solitary housing of social animals should be limited to the minimum period required and additional enrichment must be provided, unless exempted for scientific or veterinary reasons.

**5.3. Programmatic Exemptions.** The following are IACUC approved program-wide social housing exemptions:

- 5.3.1. Scientific justification is provided in an IACUC approved protocol
- 5.3.2. The PI may remove animals from social housing on an individual basis due to incompatibility or for veterinary medical and/or animal welfare concerns. This must be documented in the medical record/cage card and be reviewed by the AV, or designee.
- 5.3.3. Standard practices in managing surgery or other technical procedures including:
  - 5.3.3.1. Single housing animals for fasting prior to surgery or other procedures that require general anesthesia.
  - 5.3.3.2. Single housing animals during the post-operative period for recovery and observation.
- 5.3.4. Single housing breeder males between mating with females.
- 5.3.5. Females may be singly housed when pre-parturient.
- 5.3.6. Adult boars, stallions, and male rabbits can be housed singly.



5.3.7. A single animal remains from a cohort due to situation of: attrition of cage/pen mates, uneven number of animals present, separation due to aggression, last remaining experimental cohort, single animal ordered, or no compatible cohort to be paired with at time of weaning.

**6. EXCEPTIONS**

- 6.1. The PI may request an exception to the above standards by describing the departure in the AUP
- 6.2. For programmatic exceptions, the facility director or manager may submit a request for the exception using TAMU-F-013

**7. REFERENCES, MATERIALS, AND/OR ADDITIONAL INFORMATION**

- 7.1. References:
  - 7.1.1. National Research Council Guide for the Care and Use of Laboratory Animals, Eighth Edition. National Academy of Sciences, 2011
  - 7.1.2. The Federation of Animal Science Societies Guide for the Care and Use of Agricultural Animals in Research and Teaching, 2010
  - 7.1.3. Animal Welfare Act (AWA, Public Law 89-544, 7 U.S.C.)
  - 7.1.4. [AAALAC International's Position Statement on Social Housing](http://www.aaalac.org/accreditation/positionstatements.cfm#social), <http://www.aaalac.org/accreditation/positionstatements.cfm#social>.
  - 7.1.5. [AAALAC FAQ Social Housing and Social Experience](http://www.aaalac.org/accreditation/faq_landing.cfm#C6), [http://www.aaalac.org/accreditation/faq\\_landing.cfm#C6](http://www.aaalac.org/accreditation/faq_landing.cfm#C6)
  - 7.1.6. The National Center for the 3Rs Blog Tuesday 19 December 2017, "Tickling rats: a social enrichment to improve rodent welfare"
  - 7.1.7. Reed, B., Jennings, M. (2010). Guidance on the housing and care of Zebrafish (Danio rerio). Research Animals Department, Science Group, RSPCA
- 7.2. [IACUC/AWO Referenced Documents](#): (requires TAMU NetID authentication)
  - 7.2.1. TAMU-F-013 Request for Programmatic Exception from Animal Welfare Standards
- 7.3. For more information regarding enrichment and social housing, please contact:
  - 7.3.1. [CMP](#) at (979) 845-7433
  - 7.3.2. [ARU](#): at (214) 828-8149
  - 7.3.3. [PAR](#): at (713) 677-7471
  - 7.3.4. [PRF](#): at (361) 221-0770
  - 7.3.5. [Sea Life Center](#): at (409) 740-4574
- 7.4. Acknowledgements
  - 7.4.1. This document was partially adapted with materials obtained from the Ohio State University and the Universities of Pittsburgh and California.

**8. HISTORY**

Effective Date	Version #	Description
08/15/2019	000	College Station/Galveston: New Document
02/21/2020	001	Houston/Kingsville: New document and content; replaced IBT-210.02
03/03/2020	001	Administrative update of location-specific definitions and contact information in 4.8, 5.3.2.6, 6.2
03/17/2020	002	Dallas: New document and content; replaced CD-210.01
03/24/2022	003	College Station/Dallas/Galveston: Merging of Dallas animal care and use program with College Station/Galveston
05/01/2022	004	College Station/Dallas/Galveston: Renewal; updated definitions, enrichment examples, references. Added Exceptions section. Reviewed and approved via email.



06/01/2022	005	Houston/Kingsville: Renewal; updated definitions, enrichment examples, references. Added Exceptions section. Reviewed and approved via email.
10/20/2022	006	College Station/Dallas/Galveston/Kingsville: Merging of Kingsville animal care and use program with College Station/Dallas/Galveston.