ANIMAL EYE CONSULTANTS OF IOWA

Animal Eye Consultants of Iowa	
Institutional Animal Care and Use Committee	
Policy #30	**?Environmental Enrichment at AEC?**
Approval Date: 1/20/26 (Replacing version 10/31/22)	

A. Purpose

Animals housed at all Animal Eye Consultants of Iowa locations will be provided with species-appropriate enrichment and opportunities to express species-specific behaviors that meet or exceed regulatory requirements with the goal of enhancing animal well-being.

B. Background

The Animal Welfare Act, *The Guide for the Care and Use of Agricultural Animals in Research and Teaching* (*Ag Guide)* and *The Guide for the Care and Use of Laboratory Animals* (*ILAR Guide*) detail basic behavioral management expectations in the broad areas of structural environment, social environment, and activity. Exemptions to environmental enrichment and social housing in research and teaching protocols and written operating procedures require justification and approval by the IACUC.

C. Roles

1. Research and Animal Care Staff will abide by the institution's policy unless **prior approval** for an exemption has been obtained from the IACUC.
2. Researchers will describe exemptions to social housing and environmental enrichment (EE) with supporting justification in the Animal Subjects Approval Form for new protocols, protocol amendments or at the three-year protocol renewal if required for the project.
3. Veterinary personnel (AEC and other responsible veterinary staff) will assess the social housing and environmental enrichment status of animals when evaluating

animal health and behavior concerns and will prescribe changes or exemptions as needed.

D. Personnel Safety

Personal Protective Equipment (PPE) and procedures routinely needed for normal activity in animal areas are required when individuals are providing environmental enrichment.

E. Policy

All Species:

a. Whenever possible, animals of the same species will be housed in situations that most accurately reflect natural groupings. Single housing of a social animal should be the exception and justified based on experimental requirements and approved by the IACUC or due to veterinary–related concerns about animal well-being. Naturally communal/social species include rats, mice, gerbils, guinea pigs, rabbits, cats, dogs, cattle, sheep, goats, camelids, horses, swine, zebrafish, and poultry. It is desirable to maintain familiar animals together once a social group or pair is established and care must be taken when introducing new animals.
b. All species should be provided with, at minimum, direct or indirect social housing (if a social species) or at least one type of appropriate species-specific manipulanda or other enrichment opportunity unless justified based on experimental requirements and approved by the IACUC or due to veterinary–related concerns about animal well-being. Recommendations for appropriate enrichment are listed below for each species. **The option lists are not all-inclusive. Research in animal enrichment is on-going and novel options other than, or in addition to, those listed in this policy may also be appropriate.**
c. Any USDA Animal Welfare Act (AWA)-defined mandatory enrichment will be implemented unless exempted based on veterinary concerns. This includes solid resting surfaces and exercise for dogs and elevated resting surfaces for cats.

d. Enrichment materials/objects must be non-toxic & easily sanitizable or disposable.
e. Supplemental food enrichment (treats, vegetables, seeds, fruits) must be consistent with or have a minimal impact on overall nutrition and must comply with the bio-security standards for the species involved. Supplemental feeding on the cage floor for enrichment purposes and foraging opportunity is acceptable but uneaten feed should be removed promptly to prevent spoilage. If live feed is offered as an enrichment option, any vertebrate animals used for live feeding to other animals should be described on the ASAF.
f. Animal behavior is observed as part of daily health checks. Modifications to environmental enrichment and social conditions should be implemented in the event of adverse behavior or detrimental health consequences.
g. Consultation with the PI is necessary prior to modifying the existing care or interaction with the research animal and prior to introducing novel items to prevent any untoward effects upon the research outcomes.

F. Special Notes and Exemptions

1. **Research Exemptions**
   - Exemptions based upon research needs must be considered and approved by the IACUC before initiation of the exemption.

2. **Post-Surgical Care**
   - Researchers DO NOT require an exemption for single housing of immediate post-operative recovery patients. Post-operative recovery is defined as from the time of surgery up to 14 days post-surgery.

3. **Clinical Veterinary Care**
   - Exemptions to enrichment and social housing MAY BE GRANTED by the attending veterinarian or his/her designee for issues based on animal health, condition, or well-being or health of the group (i.e., quarantine). This exemption (veterinary exemption) must be in writing, specific to the affected animal(s), for a defined time period and written in the animal's record. The time period for the exemption must be recorded and

extension of the initial exemption would require the attending veterinarian, designee or animal facility management (in consult with designated veterinary staff) re-examine the animal and record the medical justification in the animal's record. The Animal Welfare Act mandates that exercise exemptions for dogs must be reviewed by the attending veterinarian every 30 days.

4. **Non-Social/Solitary Animals**

- Some animal species are not social and specific animals (typically intact adult breeding males) within an otherwise social species are socially incompatible. Co-housing these animals may result in stress, injury and death. These animals are not typically group- or pair-housed on a continuous basis but should still have visual, olfactory, auditory and (or) possibly tactile fence-line contact with compatible conspecifics (same or compatible species). Specific individuals can cohabitate if placed in stable groups at a young age or if housed with other species. Some exemptions to social housing are listed below and do not require IACUC approval for single housing:
    - Boars (swine, bears)
    - Stallions (donkey, horse)
    - Bulls (elk, cattle)
    - Rams (bighorn & domestic sheep)
    - Bucks (deer, rabbit and goat)
    - Machos (camelids)
    - Hobs (ferret)
    - Adult male mice and gerbils
    - Hamsters & kangaroo rats: male & female
    - Venomous reptiles and amphibians
    - Bettafish
    - Pregnant female mammals (impending birth)

5. **Aggressive Animals**

- Some individual animals that would normally be socially housed may be identified as overly aggressive towards conspecifics. Attempts should be made to identify a compatible social grouping but co-housing these animals may result in stress, injury and death. These animals may be single-housed but should still have visual, olfactory, auditory and (or) possibly tactile fence-line contact with compatible conspecifics. Exemptions to social housing for aggression MAY BE GRANTED by the Attending Veterinarian, his/her designee or animal facility management. This behavioral exemption must be in writing, specific to the affected animal(s), and written in the animal's record.

6. **Space and Compatible Social Groupings**

- Some animals that would normally be socially housed may have to be housed individually because there is not another compatible animal available; for example, when a cage mate has been removed for a veterinary exemption. Individually housed social animals should be provided with the species-specific minimum enrichment for an individually housed animal until a compatible social grouping becomes available.

7. Dairy Calf Housing

- One of the main goals of the AEC Knott Dairy Center (KDC) is to train students according to the current practices of the dairy industry, which strongly favors single housing of calves.
- However, depending on management or research needs, dairy calves may also be pair or group housed. This also offers students opportunities to be trained in what may eventually become the industry's new standard.
- Single housing of dairy calves offers various health and managerial benefits. It minimizes disease transmission, prevents per pen competition for food and resting areas, and avoids damage from cross-suckling. It also makes it easier to maintain cleanliness of pens and requires less complex equipment and personnel training and oversight.
- At the KDC, calves will typically be single housed for their first 8 weeks of life, but will nonetheless remain exposed to olfactory, auditory, and visual contact with other calves and will benefit from human interaction multiple times a day as part of the environmental enrichment provided at

the facility.

- Based on the above-mentioned health, welfare, educational, and managerial reasons the IACUC approves single, pair or group housing of dairy calves at the KDC.
- Single housing of calves for research or teaching purposes outside of the KDC will need to be described in the ASAF.

G. Specific Species

1. **Mice & Hamsters**
   - Mice are social animals so will be group- or pair-housed unless otherwise approved by the IACUC or for the exemptions listed above.
   - Hamsters are not social animals, so group or pair housing is not required. Male hamsters can cohabitate if a stable group or pairing is established at a young age.
   - *Minimum enrichment for socially housed mice or hamsters*: one additional form of enrichment preferably nesting materials in addition to the regular bedding.
   - *Minimum enrichment for individually housed mice or hamsters*: at least two enrichment options preferably with one as nesting materials in addition to regular bedding.
   - Environmental enrichment options for mice and hamsters:
     - Social housing (pair or group)
     - Nesting materials (preferably shredded paper-based material)
     - Shelters, tubes, rings, lofts/platforms (may increase aggression in male mice)
     - Resting pads when housed on wire bottom caging
     - Gnawing devices (polyurethane chewing blocks/bones, aspen blocks)
     - Novel food and foraging opportunities (seeds, seed hulls, cereal, treats, vegetables)
     - Running wheels
     - Feed on the cage floor to allow normal caching behavior

- Positive human-animal interaction and training

2. **Rats & Gerbils**
   - Rats and gerbils will be group- or pair-housed unless otherwise approved by the IACUC or for the exemptions listed above.
   - *Minimum enrichment for socially housed rats or gerbils*: one additional form of enrichment.
   - *Minimum enrichment for individually housed rats or gerbils*: at least two enrichment options.
   - Environmental enrichment options for rats or gerbils:
     - Social housing (pair or group)
     - Shelters, tubes, lofts/platforms, resting pads for wire bottom caging
     - Nesting material (rats prefer long paper strips or crinkle paper) in addition to regular bedding
     - Gnawing devices (nylon chewing blocks/bones, aspen blocks)
     - Novel food and foraging opportunities (seeds, seed hulls, cereal, treats, vegetables)
     - Running wheels
     - Dust baths and digging substrate for gerbils
     - Positive human-animal interaction and training

3. **Guinea pigs**
   - Guinea pigs will be groupor pair-housed unless otherwise approved by the IACUC or for the exemptions listed above. Guinea pigs may be held in a cage as single pregnant sows to prevent overcrowding.
   - *Minimum enrichment for socially housed guinea pigs*: shelter/tube in addition to regular bedding.
   - *Minimum enrichment for individually housed guinea pig*: shelter/tube in addition to regular bedding, PLUS at least one other enrichment option.
   - Environmental enrichment options for guinea pigs:
     - Social housing (pair or group)

- Housing enrichment with shelters or tubes
- Gnawing devices (nylon chewing blocks/bones, aspen blocks)
- Novel food and foraging opportunities (seeds, seed hulls, cereal, treats, vegetables)
- Exercise opportunities outside cage
- Positive human-animal interaction and training

4. **Rabbits**
   - Rabbits will be group-, pair-housed or have cage-side contact with other rabbits unless otherwise approved by the IACUC or for the exemptions listed above.
   - *Minimum enrichment for socially housed rabbits*: forage material and at least one other enrichment option.
   - *Minimum enrichment for individually housed rabbits*: forage material PLUS at least two other enrichment options.
   - Environmental enrichment options for rabbits
     - Social housing (pair or group)
     - Indirect social housing with cage-side contact and/or sight, scent or auditory contact
     - Housing enrichment with platforms, shelters and/or substrates (straw, shavings, etc.)
     - Occupational devices (balls, rattles, other)
     - Gnawing materials (nylon chewing blocks/bones, aspen blocks)
     - Novel food and foraging opportunities (hay, hay cubes, treats, vegetables)
     - Exercise opportunities outside primary cage
     - Positive human-animal interaction and training

5. **Cats**
   - Cats will be group or pair-housed unless otherwise approved by the IACUC or for the exemptions listed above. For biosecurity and safety purposes, cats present for less than 4 weeks and cats that originate from and return to animal shelters

are exempt from required social housing.

- All cats must be provided with elevated resting areas (as defined by USDA regulations).
- *Minimum enrichment for socially housed cats*: elevated resting surface and a shelter/hiding place.
- *Minimum enrichment for individually housed cats*: elevated resting surface, a shelter/hiding place PLUS at least one other additional enrichment option offered at a given time, preferably with changes in enrichment offerings on a rotational basis.
- Implementation of enrichment should be recorded on the daily room log or enrichment log in the animal housing room.
- Environmental enrichment options for cats:
    - Social housing (pair or group)
    - Indirect social housing with cage-side contact and/or sight, scent and auditory contact
    - Elevated resting surface (platform, bed)
    - Scratching posts (if cats have claws)
    - Housing enrichment with shelters, tunnels, hammocks or hides
    - Visual stimulation (moving toys, fish tank, window)
    - Occupational devices (puzzle feeders, foraging devices)
    - Novel foods (treats)
    - Exercise opportunities with other cats or with humans (playroom time)
    - Positive human-animal interaction and training

6. **Dogs:**
    - Dogs will be group- or pair-housed unless otherwise approved by the IACUC or for the exemptions listed above. For biosecurity and safety purposes, dogs present for less than 4 weeks and dogs that originate from and return to animal shelters are exempt from required social housing. Exercise opportunity may include walking on a leash or play time in a large space with or without humans or other dogs.

- *Minimum enrichment for socially housed dogs*: solid resting surface, exercise time as defined by USDA regulations, and manipulanda.
- *Minimum enrichment for individually housed dogs*: solid resting surface and exercise time as defined by USDA regulations, PLUS at least one other additional enrichment option offered at a given time, preferably with changes in enrichment offerings on a rotational basis
- Implementation of enrichment should be recorded on the daily room log or enrichment log in the animal housing room
- Environmental enrichment options for dogs
    - Social housing (pair or group)
    - Indirect social housing with cage-side contact and/or sight, scent and auditory contact
    - Elevated resting surfaces
    - Housing enrichment with shelters, hides, or climbing structures
    - Occupational devices (toys, gnawing toys, foraging devices)
    - Novel foods (treats)
    - Exercise opportunities outside of cage
    - Exercise opportunities with other dogs or with humans (leash walks, free play)
    - Positive human-animal interaction and training

7. **Ferrets**
    - Ferrets will be group- or pair-housed unless otherwise approved by the IACUC or for the exemptions listed above.
    - *Minimum enrichment for socially housed ferrets*: hiding/resting area such as a shelf, hammock or nest box.
    - *Minimum enrichment for individually housed ferrets*: hiding/resting area such as a shelf, hammock or nest box PLUS at least one other additional enrichment option offered at a given time, preferably with changes in enrichment offerings on a rotational basis.
    - Implementation of enrichment should be recorded on the daily room log or

enrichment log in the animal housing room.

- Environmental enrichment options for ferrets:
    - Social housing (pair or group)
    - Indirect social housing with cage-side contact and/or sight, scent and auditory contact
    - Housing enrichment with shelters, tunnels, shelves, ladders, hammocks or hides
    - Visual stimulation (moving toys, fish tank, window)
    - Occupational devices (puzzle feeders, foraging devices, ferret balls, rope toys)
    - Novel foods (treats)
    - Exercise opportunities with other ferrets or with humans (playroom time)
    - Positive human-animal interaction and training

8. **Swine**
    - Swine will be group-housed, pair-housed or have visual, olfactory, auditory and (or) fence-line contact with other compatible animals (same or compatible species) unless otherwise approved by the IACUC or for the exemptions listed above.
    - *Minimum enrichment for socially housed swine*: social housing.
    - *Minimum enrichment for individually housed swine*: visual, olfactory, auditory and (or) fence-line contact with other compatible animals PLUS one other enrichment option.
    - Environmental enrichment recommendations for swine:
        - Social housing (pair or group)
        - Indirect social housing with fence-line contact and/or sight, scent and auditory contact
        - Mirror for individually housed animals
        - Pasture-type housing
        - Housing enrichment with shelters and/or substrates (straw, sand, compost)

- Occupational devices (ropes, tassels, brushes, manipulanda, foraging devices)
- Rooting materials (straw, hay, shavings or compost)
- Novel food and foraging opportunities (treats, vegetables, dog biscuits)
- Music (at <80 decibels and only during the day-light portion of the light cycle)
- Sprinklers/misting stations
- Exercise opportunities outside primary pen or crate
- Positive human-animal interaction and training

9. **Cattle, Sheep and Goats**
   - Cattle, sheep, & goats will be group- or pair-housed with other compatible animals (same or other compatible species) unless otherwise approved by the IACUC or for the exemptions listed above. For calves at KDC, refer to page 5 for Dairy Calf Housing.
   - *Minimum enrichment for socially housed cattle, sheep & goats*: social housing.
   - *Minimum enrichment for individually housed cattle, sheep & goats*: visual, olfactory, auditory and (or) fence-line contact with other compatible animals PLUS one other enrichment option.
   - Environmental enrichment recommendations for cattle, sheep & goats:
     - Social housing (pair or group)
     - Indirect social housing with fence-line contact and/or sight, scent and auditory contact
     - Mirror for individually housed animals
     - Pasture or large outdoor pens
     - Shelters
     - Loafing areas
     - Occupational devices (scratching brushes, licks, pellet feeders, manipulanda)
     - Quiet, low-pitched music (at <80 decibels and only during the day-light

portion of the light cycle)

- Sprinklers/misting stations
- Daily exercise opportunities outside primary pen or stall (walking, turn-out)
- Positive human-animal interaction and training

10. Camelids and Horses

- Camelids and horses will be group- or pair-housed with other compatible animals (same or other compatible species) unless otherwise approved by the IACUC or for the exemptions listed above.
- *Minimum enrichment for socially housed camelids and horses*: social housing.
- *Minimum enrichment for individually housed camelids and horses*: visual, olfactory, auditory and (or) fence-line contact with other compatible animals PLUS one other enrichment option.
- Environmental enrichment recommendations for camelids & horses:
    - Social housing (pair or group)
    - Indirect social housing with fence-line contact and/or sight, scent and auditory contact
    - Mirror for individually housed animals
    - Pasture or large outdoor pens
    - Shelters
    - Loafing areas
    - Dust baths
    - High fiber forage-based diet such as hay or pasture
    - Occupational devices (scratching brushes, licks, pellet feeders, manipulanda)
    - Novel food and foraging opportunities (treats, fruit, vegetables)
    - Music (at <80 decibels and only during the day-light portion of the light cycle)
    - Sprinklers/misting stations

- Exercise opportunities outside primary pen or stall (walking, turn-out)
- Positive human-animal interaction and training

11. Avian Species (poultry, raptors and caged birds)

- Social avian species (poultry, finches, pigeons, etc.) will be group- or pair-housed, or have visual, auditory and olfactory contact with other compatible birds unless otherwise approved by the IACUC or for the exemptions listed above. Non-social species (raptors) do not require social housing.
- *Minimum enrichment for socially housed birds*: At least one environmental enrichment item.
- *Minimum enrichment for individually housed birds*: At least two environmental enrichment options.
- Environmental enrichment options for poultry and other birds:
    - Social housing (pair or group if a social species)
    - Indirect social housing with cage-side contact or sight, scent and auditory social contact
    - Pasture-type housing
    - Perches, branches, swags and ropes
    - Nestboxes/shelter
    - Nesting materials
    - Occupational devices (manipulanda, scratch pads, dust baths, water bath/pool, foraging devices, mirrors)
    - Foraging substrate and/or novel foods (straw, shavings, seeds, treats, vegetables, meal worms)
    - Exercise opportunities or time outside of cage (flight cage, large aviaries, pasture, swimming area for ducks & other aquatic birds, walks)
    - Positive human-animal interaction and training

12. Fish

- Schooling fish (e.g., zebrafish) should be group- or pair-housed unless otherwise

approved by the IACUC or for the exemptions listed above.

- *Minimum enrichment for socially housed fish*: other compatible fish.
- *Minimum enrichment for individually housed fish*: additional enrichment options may be considered.
- Environmental enrichment options for zebrafish & other fish:
    - Social housing (pair or group)
    - Barriers, hides, shelters, aquatic plants (live or artificial)
    - Aquarium substrate (sand, silt, marbles, gravel, under tank images, etc.)
    - Live feed (rotifers, paramecium, brine shrimp)
    - Flowing water (raceways, continuous flow tanks)
    - Gradual light changes

13. Aquatic Amphibians

- Aquatic frogs (*Xenopus* species) should be pair- or group-housed unless otherwise approved by the IACUC or for the exemptions listed above.
- *Minimum enrichment for socially & individually housed frogs*: shelter, hide, lily pad or plant (live or artificial).
- Environmental enrichment options for aquatic frogs:
    - Social housing (pair or group)
    - Hides, shelters, lily pads or aquatic plants (live or artificial)
    - Aquarium substrate (sand, silt, marbles, gravel, under tank images, etc.)
    - Live feed (rotifers, paramecium, brine shrimp)
    - Temperature gradient

14. Semi-aquatic and terrestrial amphibians and reptiles

- Many species of semi-aquatic amphibians and semi-aquatic and terrestrial reptiles are social and should be pair- or group-housed. Group-housed animals should be of similar size to prevent cannibalism. Solitary species may be individually housed, and venomous species should be individually housed for safety of the animal care personnel.

- *Minimum enrichment for socially and individually housed animals*: at least one environmental enrichment option.
- Environmental enrichment options for semi-aquatic and terrestrial amphibians and reptiles:
    - Social housing (pair or group)
    - Hides, shelters, plants (live or artificial)
    - Terrestrial or aquatic substrate (sand, silt, marbles, moss, gravel, under tank images, etc.)
    - Live feed (crickets, meal worms, blood worms, goldfish, etc.). The use of live vertebrate animals for feed should be included in the ASAF and alternative options considered.
    - Basking areas and/or temperature gradient
    - Both aquatic and terrestrial areas within the same enclosure (pools)

15. Wildlife

- Whenever possible, the housing, social accommodation and environmental enrichment for wildlife species or non-traditional experimental subjects should attempt to replicate the natural habitat and social groupings for that species. The enrichment options for similar domestic species listed above may be applicable for a wildlife equivalent.
- Environmental enrichment options for wildlife species:
    - Social housing (pair or group) if appropriate
    - Social housing with another compatible species if appropriate
    - Indirect social housing with fence-line or cage-side contact or sight, scent and auditory social contact
    - Naturalistic housing (pasture, pond, etc.)
    - Barriers, hides, shelters, platforms, or retreat areas
    - Substrate (sand, soil, boulders, marbles, gravel, hay, straw, shavings, etc.)
    - Occupational devices (brushes, manipulanda, foraging devices, licks)
    - Novel food and foraging opportunities (treats, browse, high fiber diets)

- Exercise opportunities inside or outside of normal housing
- Positive human-animal interaction and training

H. References

There is an ever-increasing body of literature related to environmental enrichment in research animals. Below is a partial listing of documents reviewed in formulating the above policy.

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11. G.M. Cooke, B.M. Tonkins, J.A. Mather, 2019, Care and Enrichment for Captive Cephalopods. In: Carere C., Mather J. (eds) The Welfare of Invertebrate Animals. Animal Welfare, vol 18. Springer, Cham. https://doi.org/10.1007/978-3-030-13947-6_8
12. G. Fiorito, A. Affuso, J. Basil, et al., Guidelines for the Care and Welfare of Cephalopods in Research – A consensus based on an initiative by CephRes, FELASA and the Boyd Group. *Laboratory Animals*, Volume 49, Issue 2_suppl, 2015 Pages 1–90.
13. *Does Rodent Enrichment Make Sense/Cents?* Webinar by Karena Thek, Bio-Serv, May 5th, 2020.