Michigan Technological University

IACUC

Animal Procedure Policies

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Animal Procurement

1. Procurement of all animals housed in the Animal Care Facility
    a. Procurement of all animals that are to be housed in the Animal Care Facility must be completed by Animal Research Protection Program (ARPP) staff. Obtaining animals from either of the sources below requires ARPP approval via the Procurement Request form, before animals can be purchased or transferred.
        i. Commercial Vendors
            1. Jackson Laboratories
            2. Charles River Laboratories
        ii. Other Institutions
2. Procurement of all animals housed in PI maintained animal facilities
    a. Animals housed in PI maintained facilities that are procured from the sources mentioned above will also need ARPP approval via Procurement Request form, before animals can be purchased or transferred.
3. Transfer of animals across research protocols
    a. Procurement request forms are NOT required when animals are transferred between campus research protocols, when there is IACUC approval for this activity. However, the PI is required to send an email notification to ARPP staff (acf-l@mtu.edu) prior to any transfer so that ARPP staff are aware of this activity.
4. Principal Investigator, IACUC, and ARPP Responsibilities
    a. Investigator Responsibilities:
        i. Research staff complete appropriate sections of the Animal Procurement Request and submit. The form is received directly by ARPP staff. If no other information is required, the order will be placed by ARPP according to the information provided. Following order completion, notification will be sent to the PI. The transferring institution will also be informed, if applicable.
    b. IACUC Responsibilities:
        i. Members of the Institutional Animal Care and Use Committee (IACUC) must evaluate protocols for the appropriate justification of species and numbers of animals requested, requiring statistical justification, when possible. (Refer to the 8th edition of the Guide, p. 25-26.)
        ii. The IACUC will notify Principal Investigators of this Policy, noting their responsibility to request all animals via the approved procurement procedure and to provide numbers that accurately reflect the use of research animals, with all methods of procurement approved.
    c. ARPP Responsibilities:
        i. ARPP staff members will automatically receive the Animal Procurement Request Form, verifying the IACUC approved protocol, adequate numbers of animals, and approved vendors. After verification, ARPP staff will place the order with the

commercial vendor or contact the sending institution. PIs will be notified of successful order placement and/or anticipated arrival date.

5. Exceptions
    a. The Attending Veterinarian or designee may grant exceptions to this policy when it is deemed in the best interest of the animals.
    b. Concerns or issues regarding animal procurement must be reported to and will be reviewed by the IACUC.

Euthanasia Criteria for Rodents

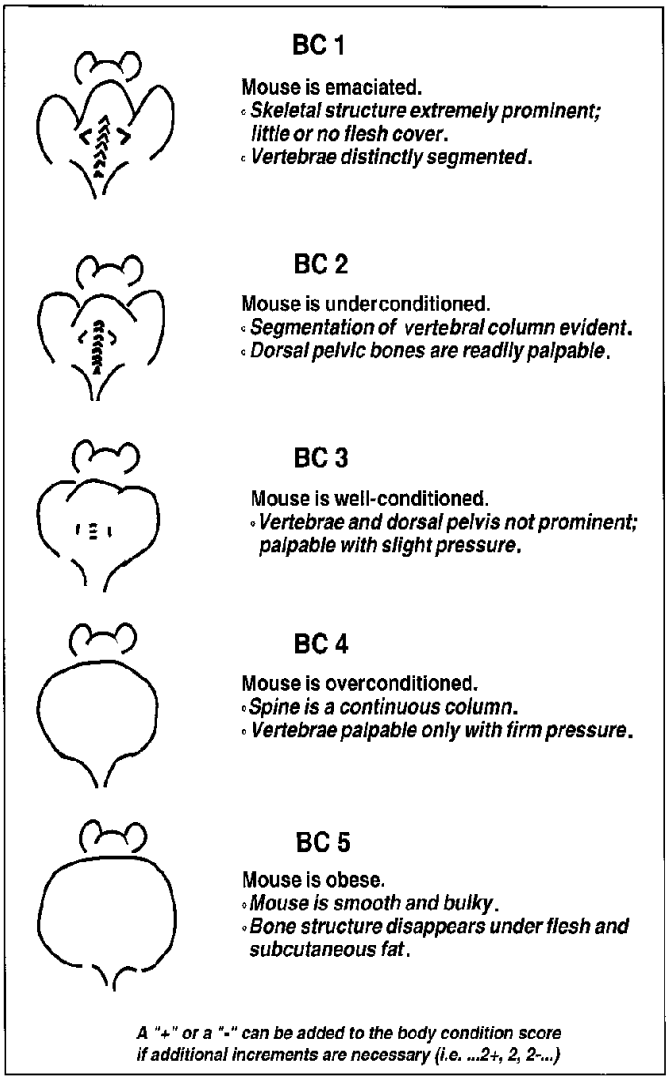
Approved by IACUC on 04/07/2023

1. Humane euthanasia before the end of an experiment can be warranted to prevent unnecessary pain and suffering for laboratory animals. These guidelines are for ACF and IACUC personnel to assist with the decision to euthanize an animal if the ACF veterinarian is temporarily not in contact. Any exceptions to these endpoints should be noted in the IACUC protocol and also brought to the attention of ACF staff to prevent communication mishaps. Every attempt will be made to contact lab staff to allow for joint consultation and to allow for collection of tissue. It is recommended that laboratory personnel leave cell phone numbers with ACF.
2. Humane endpoint criteria (only 1 needs to be present):
    a. Body condition score of 2 or less (see diagram at end).
    b. Frank blood coming from the nasal cavity, oral cavity, or rectum.
    c. Fight wounds that are larger than 1 cm^2 combined.
    d. Damage to the penis such that the mouse is no longer able to urinate. Note that most mice will urinate when picked up and scruffed. The bladder can also be pushed on gently to see if urine will come out.
    e. Tumors that are larger than:
        i. Mice: 1 cm^2 combined;
        ii. Rats: 2 cm^2 combined.
    f. Tumors that have a necrotic center.
    g. Moribund condition: rodent does not move or react when touched. Rodent does not right itself when placed on its side.
    h. Ulcerative dermatitis (UD) that is not responsive to toe nail trimming. 'Moist' UD, as it rarely responds to toe nail trimming.
    i. Jaundice, as evidenced by yellow ears.
    j. Diarrhea or blood in stool.
    k. Labored breathing, as evidenced by increased abdominal effort.
    l. Circling or rolling behavior.
    m. Head tilt.
    n. Seizures.
    o. Rapid weight loss, or weight loss of greater than 20%.
    p. Inability to reach food or water, usually with an inability to ambulate.
    q. Prolapsed rectum, vagina, or uterus.
3. Contacts
    a. IACUC – iacuc@mtu.edu

b. Contact information for ACF Staff and the ACF Director: acf-l@mtu.edu or 906- 487-2878

4. Related Information
    a. PHS Policy on Humane Care and Use of Laboratory Animals
    b. The Guide for the Care and Use of Laboratory Animals, 8th Edition
    c. USDA Policy #3 Veterinary Care
5. References
    a. Body Condition Scoring: A Rapid and Accurate Method for Assessing Health Status in Mice, Mollie H. Ullman-Culleré and Charmaine J. Foltz, JAALAS Vol 49, No 3 June 1999.

Appendix 1



Mouse Breeding Colony Management

1. Personnel Responsible
    a. This policy applies to all personnel involved in activities involving the care and/or use of mice in Michigan Tech's Animal Care Facility (ACF) regardless of the funding source.
    b. "Research Staff" as referred to in this policy is defined as the principal investigator and any staff or students working with them, NOT the Animal Care Facility staff.
2. Background
    a. The purpose of this policy is to address the health and well-being of mice by ensuring safe population densities. Animal overcrowding can contribute to significant animal welfare issues and therefore may violate federal and University policies on the humane care of animals if not expediently addressed.
3. Breeding Schemes
    a. Housing in Standard Cages:
        i. Breeding mice can be done in:
            1. Pairs (one male, one female)
            2. Trios (one male, two females)
            3. Quintet/Quartet (one male, three or four females)
        ii. For pairs and trios, the breeding cages may be set up on a continuous basis, leaving the male with the female(s) after pups are born. Multiple litters of differing ages are NOT allowed. Weaning schedules must be strictly managed to avoid overcrowding cages with animals that are nearly adult-sized along with newborn pups. Please see the section "Sanctions."
        iii. In continuous breeding cages, the preferred scheme is pairs when the following two factors exist:
            1. The strain produces large numbers of offspring (≥10 pups/litter)
            2. Weaning needs to be delayed beyond 21-23 days due to the small size of offspring and their inability to thrive(as occurs for some inbred strains).
        iv. Breeding trios (one male, two females) should be closely managed to ensure that overcrowding does not occur. If the strain of mice used regularly produces large litters (≥10 pups), the litters should be weaned between 21–23 days.
        v. For inbred strains that produce large litters (≥10) and also require 28 days for proper weaning, the PI will justify the need for trio breeding with delayed weaning in the IACUC protocol for review on a case–by– case basis.

vi. When Quintet/Quartet breeding, visibly pregnant females must be moved to their own cage to prevent housing multiple pre-weanling litters with more than 3 adults.
vii. To ensure the well-being of newborn animals, as well as to provide adequate data regarding birth and weaning dates, cages must be adequately labeled by the investigator with the date of birth of each litter.

4. Weaning:
    a. The Research Staff is responsible for cage card documentation and for separating and weaning mice. Litters must be weaned according the procedures defined in the investigator's approved animal protocol.
    b. Male and female pups must be separated at weaning unless they are being set up as new breeding cages, using one of the schemes defined above (pair, trio, quintet/quartet).
    c. Weaned pups must have a minimum of 2 mice per cage. In the case of a lone female, she may stay with the mother. In the case of a lone male, he should be paired with a similarly aged litter of the same strain, in the same room. If this is not possible, he should be provided with extra enrichment (multiple tubes or houses/huts) and the ACF Director should be notified (acf-l@mtu.edu).
    d. Allowing a 3-week old litter to stay in the cage with a lactating female that also has a newborn litter is NOT permitted.
5. Exceptions:
    a. In the event that a litter cannot be weaned according to the approved schedule specific to the protocol, the investigator should notify ACF staff by appropriately labeling the cage, including the expected weaning date.
    b. For strains that consistently require delayed weaning, exceptions to the 21-23 day weaning age may be made. Exceptions must be requested in the IACUC protocol. The request should include justification (scientific, via a performance standard) for extended weaning and should include appropriate documentation or scientific justification. Once approved by IACUC this extended weaning time is acceptable.
6. ACF Actions When Cages Have Become Overcrowded
    a. The ACF Staff checks for overcrowding when changing cages. Any cages that might be considered overcrowded according to standards defined above are marked with an "Overcrowded" or "Please Wean Pups" Card, dated and initialed.
    b. When overcrowding is noted, the Research Staff is contacted once via email and given up to 72 hours to correct the problem, depending on the severity of the overcrowding. Alternatively, if the investigator feels that weaning should be delayed further, the ACF Director must be consulted.
        i. If cages are extremely overcrowded (>1/4 of cage floor space is occupied by animals) to the extent animal welfare is affected, ACF staff will promptly separate cages. New cage cards will be marked with the "coordinate" number (A1, B2, etc.) of the original cage, plus "A", "B", etc. for each new cage created due to separation.

Research staff are responsible for checking the newly created cages ASAP. ACF staff are not responsible for accurate sexing.

1. Situations where extreme overcrowding occurs may result in sanctions for the research lab. Please see the section "Sanctions" below.

ii. NOTE – Weekends and Holidays are INCLUDED in the 72 hours and are NOT EXEMPT.

c. If overcrowding is not addressed within the allotted time, please see "Sanctions" below.

7. Sanctions
   a. Investigators will be notified that they are out of compliance with IACUC regulations for each incident in which overcrowding has occurred because weaning was delayed past the age prescribed in the approved protocol OR in cases where pregnant females were not separated and there are multiple pre-weanling litters in the same cage. In such cases, the investigator may be subject to further remedial actions as deemed necessary by the IACUC, including a loss of breeding colony privileges.
8. Contacts
   a. IACUC – iacuc@mtu.edu
   b. Contact information for ACF Staff and the ACF Director: acf-l@mtu.edu or 906- 487-2878
9. Related Information
   a. PHS Policy on Humane Care and Use of Laboratory Animals
   b. The Guide for the Care and Use of Laboratory Animals, 8th Edition
   c. Final Rules: Animal Welfare; 9 CFR Parts 1, 2, and 3
10. References
    a. University of California San Francisco, Office of Research, Institutional Animal Care and Use Program - Mouse Cage Density
    b. Heiderstadt KM, Blizard DA, "Increased juvenile and adult body weights in BALB/cByJ mice reared in a communal nest." J Am Assoc Lab Anim Sci. 2011 Jul;50(4):484-487.
    c. Hickman DL, MP Swan. "Effects of Age of Pups and Removal of Existing Litter on Pup Survival during Cross-Fostering between Multiparous Outbred Mice." J Am Assoc Lab Anim Sci. 2011 Sept;50(5):641-646.

Rat Breeding Colony Management

1. Personnel Responsible
    a. This policy applies to all personnel involved in activities involving the care and/or use of rats in Michigan Tech's Animal Care Facility (ACF) regardless of the funding source.
    b. "Research Staff" as referred to in this policy is defined as the principal investigator and any staff or students working with them, NOT the Animal Care Facility staff.
2. Background
    a. The purpose of this policy is to address the health and well-being of rats by ensuring safe population densities. Animal overcrowding can contribute to significant animal welfare issues and therefore may violate federal and University policies on the humane care of animals if not expediently addressed.
3. Breeding Schemes
    a. Housing in Standard Cages:
        i. Assuming an average adult rat weighs 250-400 grams, the standard cages in the ACF can hold up to 3 adult rats. Breeding rats can be done in:
            1. Pairs (one male, one female)
            2. Trios (one male, two females)
        ii. For pairs and trios, the breeding cages may be set up on a continuous basis, leaving the male with the female(s) after pups are born. Multiple litters of differing ages are NOT allowed. Weaning schedules must be strictly managed to avoid overcrowding cages with animals that are nearly adult-sized along with newborn pups. Please see the section "Sanctions."
        iii. In continuous breeding cages, the preferred scheme is pairs when the following two factors exist:
            1. The strain produces large numbers of offspring (≥10 pups/litter)
            2. Weaning needs to be delayed beyond 21-23 days due to the small size of offspring and their inability to thrive (as occurs for some inbred strains).
        iv. Breeding trios (one male, two females) should be closely managed to ensure that overcrowding does not occur. If the strain of rats used regularly produces large litters (≥10 pups), the litters should be weaned between 21–23 days.
        v. For inbred strains that produce large litters (≥10) and also require 28 days for proper weaning, the PI will justify the need for trio breeding with delayed weaning in the IACUC protocol for review on a case-by-case basis.

vi. When trio breeding, visibly pregnant females must be moved to their own cage to prevent housing multiple pre- weanling litters in the same cage.
vii. To ensure the well-being of newborn animals, as well as to provide adequate data regarding birth and weaning dates, cages must be adequately labeled by the investigator with the date of birth of each litter.

4. Weaning:
    a. The Research Staff is responsible for cage card documentation and for separating and weaning rats. Litters must be weaned at 21 days unless the investigator's approved animal protocol states otherwise.
    b. Male and female pups must be separated at weaning unless they are being set up as new breeding cages, using one of the schemes defined above (pair or trio).
    c. Weaned pups must have a minimum of 2 rats per cage. In the case of a lone female, she may stay with the mother. In the case of a lone male, he should be paired with a similarly aged litter of the same strain, in the same room. If this is not possible, research staff can attempt to combine him with an older male rat. The cage must be monitored closely (two times per day for three days) for fighting. If fighting occurs, separate and contact the ACF Director.
    d. Allowing a 3-week old litter to stay in the cage with a lactating female that also has a newborn litter is NOT permitted.
5. Exceptions:
    a. In the event that a litter cannot be weaned according to the approved schedule specific to the protocol, the investigator should notify ACF staff by appropriately labeling the cage, including the expected weaning date.
    b. For strains that consistently require delayed weaning, exceptions to the 21-23 day weaning age may be made. Exceptions must be requested in the IACUC protocol. The request should include justification (scientific, via a performance standard) for extended weaning and should include appropriate documentation or scientific justification. Once approved by IACUC this extended weaning time is acceptable.
6. ACF Actions When Cages Have Become Overcrowded
    a. The ACF Staff checks for overcrowding when changing cages. Any cages that might be considered overcrowded according to standards defined above are marked with an "Overcrowded" or "Please Wean Pups" Card, dated and initialed.
    b. When overcrowding is noted, the Research Staff is contacted once via email and given up to 72 hours to correct the problem, depending on the severity of the overcrowding. Alternatively, if the investigator feels that weaning should be delayed further, the ACF Director must be consulted.
        i. If cages are extremely overcrowded to the extent animal welfare is affected, ACF staff will promptly separate cages. New cage cards will be marked with the "coordinate" number (A1, B2, etc.) of the original cage, plus "A", "B", etc. for each new cage created due to

separation. Research staff are responsible for checking the newly created cages ASAP. ACF staff are not responsible for accurate sexing.

1. Situations where extreme overcrowding occurs may result in sanctions for the research lab. Please see the section "Sanctions" below.

ii. NOTE – Weekends and Holidays are INCLUDED in the 72 hours and are NOT EXEMPT.

c. If overcrowding is not addressed within the allotted time, please see "Sanctions" below.

7. Sanctions
    a. Investigators will be notified that they are out of compliance with IACUC regulations for each incident in which overcrowding has occurred because weaning was delayed past the age prescribed in the approved protocol OR in cases where pregnant females were not separated and there are multiple pre-weanling litters in the same cage. In such cases, the investigator may be subject to further remedial actions as deemed necessary by the IACUC, including a loss of breeding colony privileges.
8. Contacts
    a. IACUC – iacuc@mtu.edu
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    b. The Guide for the Care and Use of Laboratory Animals, 8th Edition
    c. Final Rules: Animal Welfare; 9 CFR Parts 1, 2, and 3
10. References
    a. University of California San Francisco, Office of Research, Institutional Animal Care and Use Program - Rat Cage Density
    b. UMDNJ New Jersey Medical School Comparative Medicine Resources Rodent Breeding Policy and Standard Operating Procedures (SOPs).
    c. The Guide for the Care and Use of Laboratory Animals. 1996. NRC ILAR. P.27. Table 2.1. Recommended Space for Commonly Used Group-Housed Laboratory Rodents.
    d. Indiana University, Office of Research Compliance, Rat Breeding and Housing Density Standard Operating Procedure.

Rodent Barbering

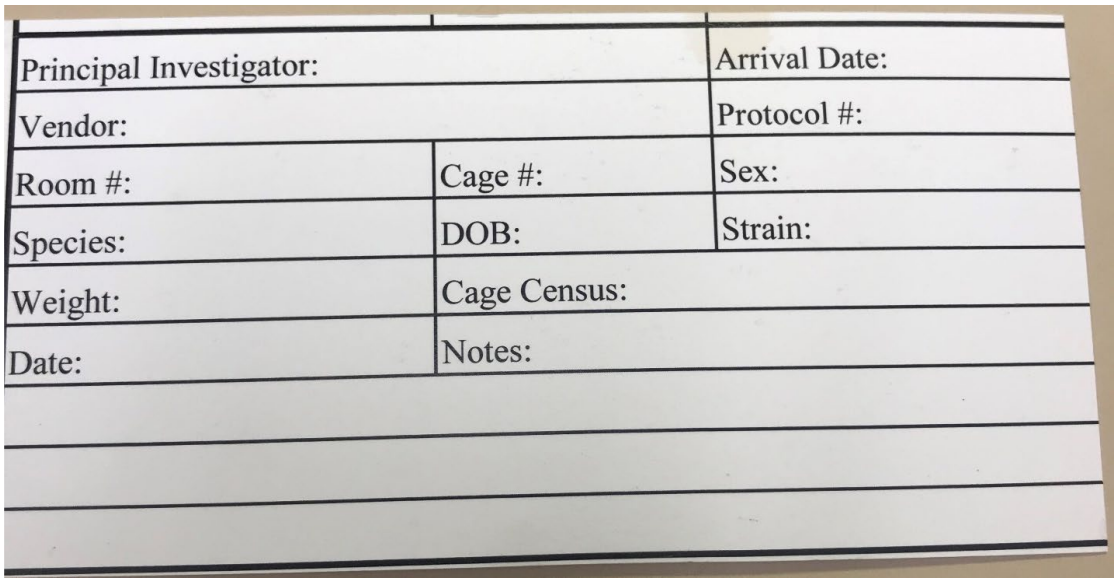
1. Personnel and Purpose
    a. This standard operating procedure is designed to be used by laboratory managers, animal caretakers, and researchers to manage and minimize barbering in laboratory mice.
2. Explanation of Barbering
    a. Barbering is defined as abnormal whisker and fur plucking behavior commonly seen in mice. It has been thought to be associated with an expression of social dominance.
    b. The implications on the research results are still unknown, thus the overall consequences for the research and its validity are unknown. If barbering is widespread within a research group, consideration by the researcher as to the full effects on their results must be taken.
    c. Incidence and Risk Factors
        i. A female bias
        ii. Onset during puberty
        iii. Reproductive status and genetic background
            1. More likely in C57BL/6 and 129s derived strains
        iv. Husbandry factors such as cage design, cage location, cage mate relationship, and the presence of other barbers
3. Identification and Scoring Guidelines
    a. Common clinical signs:
        i. Hair loss around the whiskers, dorsal face (including the eyes), between the ears, the dorsal neck, back and rump.
        ii. Self –barbering: Barbering to oneself which is commonly seen in mice housed separately. This tends to present as hair loss around the chest, genitals, and the inside and outside of the forearms.
        iii. Infected wounds: Wounds can become infected if the biting damages the outer layers of the skin and allows bacteria to gain entry and form an infection. It is a potential cause of a condition called Ulcerative Dermatitis. See Policy #6: Managing Ulcerative Dermatitis in Rodents.
    b. Scoring Guidelines
        i. Mild -- the mice show some very mild hair loss around face and ears. It appears mainly as a thinner coat cover in these areas. The mouse shows normal behaviors in the cage.
        ii. Moderate – quite a lot of hair loss over head, neck, legs or thorax. In these patches, the skin is still intact and there is no evidence of infection.
        iii. Severe- the hair loss has progressed, and the skin is broken through. The skin visible is red and shiny and may appear infected (moist with a discharge). The mouse may or may not be showing other signs of stress or discomfort such as anorexia, quiet behavior.
4. Management

a. Once barbering has been identified within a cage, a standard plan of action will be instigated by the researcher and animal caretakers.
    i. Identify the mouse that is performing the barbering. There is usually one unaffected mouse in the cage. Separate that mouse to a different cage.
    ii. Closer monitoring – once daily inspection of wounds
    iii. Increase the rotation of environmental stimulation
    iv. If their condition deteriorates or are not viable for the project, they should be culled immediately.
    v. If the wounds begin to break through the skin and become infected, the affected mouse will be treated for its wounds. See Policy #6: Managing Ulcerative Dermatitis in Rodents.

5. Documentation
    a. Cages with suspected barbering should be marked. Staff and the ACF Director should monitor the cage for any signs of Ulcerative Dermatitis (visit IACUC Policy #6: Managing Ulcerative Dermatitis in Rodents).
6. Exceptions
    a. The Attending Veterinarian or designee may grant exceptions to this policy when it is deemed in the best interest of the animals.

Rodent Cage Card Identification

1. Personnel Responsible
    a. The laboratory Principal Investigator (PI) is responsible for ensuring that all cages under their name have appropriate identification.
2. Unit of Identification
    a. Rodents are identified by cage card, located on the front of the cage, on a cage- by-cage basis. Individual animals can be identified by other means (ear tags, tattoos) but only the cage card is required.
3. Minimum information required on cage cards:
    a. The following items are required on all rodent cages:
        i. Principal Investigator Name
        ii. Active IACUC Protocol Number in L0XXX format
        iii. Vendor (either commercial vendor, previous institution, or "ACF Bred")
        iv. Species
        v. Strain or Commercial Vendor Stock Number
        vi. Cage # (specific to lab or coordinate system used on the cage rack – i.e. A1)
        vii. Sex
        viii. Date of Birth OR Date of Arrival
            1. ACF Bred animals need Date Of Birth, Vendor supplied animals need Date of Arrival (DOB is optional if provided by vendor)
        ix. Cage Census
            1. Must be kept updated
4. Special information that must be included in certain circumstances
    a. Special Diet or Water Requirements
        i. i.e. High fat diet or high salt diet
            1. Date started, length of time special requirements will be in place
    b. Any hazards associated with the cage
        i. i.e. Biohazards, carcinogens, chemical hazards
            1. Specific hazards must be included (i.e. streptozotocin)
            2. Application date and end date must be included
    c. Starting weight must be included for any animal on specialty diet or food restriction
    d. Please see *Rodent Survival Surgery* policy for surgical procedure documentation requirement for cages.
5. Exceptions
    a. The attending veterinarian or designee may grant exceptions to this policy when it is deemed in the best interest of the animals.
    b. Concerns or issues regarding rodent cage identification must be reported to and will be reviewed by the IACUC.



Principal Investigator:		Arrival Date:
Vendor:		Protocol #:
Room #:	Cage #:	Sex:
Species:	DOB:	Strain:
Weight:	Cage Census:	
Date:	Notes:	

Rodent Survival Surgery

Approved by IACUC on 11/01/2024

This version replaces all previous versions and applies to all new, renewed, and amended protocols after this date.

1) Facility

a) Surgery must be conducted on a clean, uncluttered lab bench or table. The surface of the lab bench or table must be impervious to liquids. The work surface must be wiped with disinfectant before and after use or covered with a clean drape.
b) A dedicated facility for rodent surgery is not required. A rodent surgical area can be a room or portion of a room that is easily sanitized. The immediate surgical area must not be used for other purposes during the time of surgery.
c) Select an area that is NOT directly under an air vent.
d) The surgery area MUST be separate from the area where hair is removed from the animal.

2) Training

a) Lab personnel who perform anesthesia, analgesia, and surgery must be trained and the training documented. The ACF veterinarian is available to provide training in aseptic and surgical techniques and the proper administration of anesthesia and analgesia. Please let the ACF Director know if you will need training, and it will be added to the ACF Veterinarian's itinerary for the next visit.

3) Instruments

a) Instrument Preparation
    i) All instruments must be cleaned and sterilized prior to use. First, all instruments must be cleaned of any debris by hand washing or by mechanical washer/sterilizer. Then, prior to surgery, the instruments must be steam sterilized in an autoclave.
    ii) Steam Autoclave
        (1) The instruments must be placed in a specially designed pack or wrapped in sterile drapes, packs, or cloths, and secured with a thermo-sensitive tape. The use of such tape provides some indication that the autoclave procedure was effective. Instruments must be autoclaved at 121°C for 21 minutes in a vacuum autoclave. (Different times are required for gravity autoclaves.)
        (2) Once autoclaved, packs or wrapped instruments must be stored in closed cabinets or plastic bags. Autoclaved items must have a standard indicator to prove complete sterilization.
        (3) Wrapped autoclaved items must be clearly labeled with the date of sterilization. Items that are autoclaved in cloth wraps expire 6 months after autoclaving. Items that are autoclaved in plastic packs expire 1 year from

the date of autoclaving.

iii) Ethylene Oxide Gas: This is only used for instruments that will be damaged by heat or steam sterilization. This process is toxic, expensive and is regulated by federal law. Plastic, silicon and polyethylene catheters may be sterilized with ethylene oxide gas on the cool cycle.

b) Multiple Surgeries
   i) If multiple surgeries are to be performed on different animals, previously sterilized instruments can be "quick" sterilized using a glass bead sterilizer (at least 15 sec) or disinfected with 70% alcohol (10 minutes). However, instruments should be thoroughly clean of blood or tissue prior to sterilization. No more than five successive surgeries can use instruments that have been "quick" disinfected.

c) Glass (Hot) Bead Sterilizer
   i) This instrument will sterilize the tips of metal instruments in 15 seconds. The beads should be clean. Only clean, cooled instruments may be used on the animals. This type of sterilization is ideal for multiple surgeries on multiple animals. Please note that instruments must be re-autoclaved after five animals.
      (1) NOTE: Most sterile bead sterilizers take thirty minutes to heat.
      (2) NOTE: Instruments left in longer than 60 seconds will burn your skin on removal.
      (3) NOTE: This method of sterilization may not be used for the initial sterilization of instruments; it is only appropriate when performing 5 or fewer surgeries using a single pack previously sterilized as described in the "Instrument Preparation section above.

4) Anesthesia and Analgesia Selection

a) The use of a single analgesic agent or combination of agents will depend on the procedure performed. This table provides some guidelines for determining the expected degree of pain associated with various surgical procedures. For specific advice, please consult the ACF Veterinarian.

SURGERY TYPE	**ANALGESIC**	**DURATION OF TREATMENT**
Subcutaneous incision	NSAID or opioid	Pre-emptive + 1 dose
Open abdomen	NSAID and opioid	Pre-emptive + 48 hours
Open thorax	Local and NSAID and opioid	Pre-emptive + 48 hours
Musculoskeletal manipulation (e.g., fracture, muscle resection)	Local and NSAID and opioid	Pre-emptive + 48 hours
Open cranium/burr hole	Local and NSAID and/or opioid	Pre-emptive + 48 hours
Implant or device placement (e.g., indwelling catheter)	NSAID and/or opioid and/or local	Pre-emptive + 24 hours

b) It is important to realize that no analgesics work instantly, so it is preferred that analgesics are provided pre-emptively to surgery. Generally, this can be accomplished by administering the analgesics at the time of anesthetic induction or one to two hours before the surgical procedure. The specific analgesic choice and duration of administration to use is based on the severity of pain expected. These choices listed are not necessarily interchangeable. Please consult with the ACF Veterinarian for additional guidance. Analgesics may be given pre-emptively (preferred), intra-operatively to reduce inhalant requirements and provide additional analgesia, and post-operatively.

Mouse (choose one)

- Buprenorphine 0.05-2.0mg/kg SQ every 6-12 hours SQ, IP, or IM
- Buprenorphine 0.05-2.0mg/kg every 6-12 hours SQ or IM + Carprofen 5mg/kg q 6-8 hours
- Buprenorphine 0.05-2.0mg/kg every 6-12 hours SQ or IM + Meloxicam 1-2mg/kg q 24 hours
- Buprenorphine sustained/extended release 1.0 - 3.25 mg/kg SQ once
- Carprofen 5-10mg/kg PO or SQ q 6-8 hours; can be combined with opioids
- Meloxicam 1.0-2.0mg/kg SQ, IP daily; can be combined with opioids
- Local: lidocaine, lidocaine/bupivacaine, bupivacaine.

Rat (choose one)

- Buprenorphine 0.01-0.05mg/kg SQ or IM every 8-12 hours
- Buprenorphine 0.01-0.05mg/kg SQ or IM every 8-12 hours + Carprofen 5mg/kg q 6-8 hours
- Buprenorphine 0.01-0.05mg/kg SQ or IM every 8-12 hours + Meloxicam 1-2 mg/kg once daily
- Buprenorphine sustained/extended release 1.0 - 3.25 mg/kg SQ once.
- Carprofen 5-10mg/kg orally or SQ q 6-8 hours; can be combined with opioids
- Meloxicam, 1.0-3.0mg/kg PO, SQ, IP daily; can be combined with opioids
- Local: lidocaine, lidocaine/bupivacaine, bupivacaine

5) Preparation of the Animal

a) The animal must be anesthetized with a suitable anesthetic using the doses and procedure in your protocol as approved by the IACUC.
b) An ophthalmic lubricant must be applied to the eyes to prevent corneal drying.
c) Hair must be removed from the incision site with clippers or hair removal products (i.e., Nair) and thoroughly rinsed off to prevent continual residue action.
d) Skin Preparation: The bare skin at the incision site must be thoroughly scrubbed with a surgical antiseptic agent (such as chlorhexidine scrub or povidone iodine scrub) to disinfect the skin and create a sterile field around the incision site: **Starting in the middle, and continuing in an outward spiral, apply the scrub at least three times, alternating each scrub with 70% isopropyl or ethyl alcohol, sterile water, or saline.**
    i) Note: Copious application of topical alcohol in rodents will soak the animal

and lead to hypothermia. The use of cotton tip applicators are ideal during the skin preparation process.

e) These surgical antiseptic agents may be used:
    (1) Povidone iodine scrub: A good choice for a surgical preparation with a broad spectrum of activity, including Mycobacterium. Antiseptic activity is rapid and persistent if not removed.
    (2) Chlorhexidine scrub: The 4% aqueous preparation effectively cleans the skin with a rapid onset of activity and a broad spectrum of activity with minimal loss of antiseptic activity.
        (a) NOTE: A scrub is different than a solution. A scrub contains a soap, and therefore has cleaning properties that a solution does not have. Scrubs are not to be mixed or diluted with water.
f) Antiseptic agents must be rinsed from the skin with sterile water, sterile saline or alcohol prior to surgery.

6) Preparation by Surgeon

a) Hands must be washed with an antiseptic soap or a surgical detergent/scrub (iodophors or chlorhexidine) and rinsed with water. Sterile surgical gloves must be worn. (NOTE: the FDA has banned powdered gloves.)
b) A surgical mask must be worn to prevent contamination of the surgical field.
c) Gowns and surgical bonnets are required to maintain a sterile surgical field. The sleeves of garments must not be allowed to come in contact with sterile surfaces (e.g., gloves, the animal, etc.). A new pair of sterile surgical gloves must be used for each animal. Alternatively, surgeons may wipe their gloves for 30 seconds with sterile gauze pads soaked in 70% alcohol, or with the ACF surface disinfectant for 3 minutes. Gloves must be wiped with 70% alcohol after the 3-minute surface disinfectant application.
d) If working alone, the surgeon must have the animal anesthetized and positioned prior to gloving.
e) If the instruments are in a sterile pack, the first layer of the double-wrapped instrument pack must be opened before gloving.
f) For survival surgery, the surgical site must be covered with a sterile drape after the surgeon has donned sterile gloves.

7) Intraoperative Monitoring

a) The animal must be monitored carefully during the surgical procedure. Specifically, the animal's respiratory rate and characteristic response to noxious stimuli (e.g., toe pinch), and when possible, the heart rate and body temperature, should be monitored.

8) Post-Surgical Care

a) Post-surgical care includes observing the animal to ensure uneventful recovery from anesthesia and surgery, administering analgesics, providing adequate care to surgical incisions, and maintaining appropriate medical records and post-surgical

cage cards (see card at the end of the document).

b) Administration of analgesia is required, except when specific IACUC approval has been granted.
c) To prevent hypothermia, place the animal's cage on a heat source. To prevent suffocation of the animal, it is recommended to recover the animal in a cage without bedding. The cage may be placed on a bedded or padded surface and supplied with extra bedding or supplemental heat. Water-circulating heating blankets are recommended instead of electrical heat sources. Heating blankets must be covered to avoid direct contact with the animal. Heat lamps are NOT allowed for use with rodents. It is recommended to put half the cage on the heat source and half off, so the animal has control of their environment.
d) Dehydration can be addressed by the administration of appropriate fluid therapy. Initially this may be done by giving 1 to 2 ml of warm (approximately 37ºC) sterile fluids (0.9% NaCl or Lactate-Ringers Solution) per 100 gm of body weight by subcutaneous or intraperitoneal injection. If blood loss occurred during the surgical procedure or if the animal is slow to recover from the anesthetic, additional fluids may be necessary. Do NOT give more than 1 ml of fluid to a mouse!
e) During the recovery process, animals must be monitored continually until they gain their righting reflex.
f) If recovery from the anesthetic will be prolonged (i.e., over one hour), the animal must be rotated from side to side every 15-30 minutes to minimize collapse of the lungs. This practice must be continued until the animal regains their righting reflex.
g) Post-operative animals must be evaluated daily for at least five days by a trained member of the investigator's staff. Animals must be monitored for evidence of:
    (1) excessive inflammation at the incision site,
    (2) suture dehiscence (incision line failure or separation),
    (3) infection,
    (4) behavioral abnormalities indicative of illness (anorexia, listlessness, lethargy, dehydration, ruffled coating, lack of movement, weight loss greater than 10%).
    i) If evidence of wound infection or illness is noted, ACF staff must be contacted for evaluation and treatment, or the animal must be euthanized as soon as possible.
    ii) External sutures, staples, and wound clips must be removed 10-14 days after surgery, unless otherwise approved in the protocol or by the ACF Veterinarian.
h) If infections or complications occur, ACF staff must be notified immediately.

9) Duration, frequency, type, or number of procedures to be performed on an animal

a) The duration, frequency, type, and number procedures to be performed on an animal must be approved by the attending veterinarian or their designee.

10) Surgical Records

a) A "Surgical Record" must be completed immediately after the surgical procedure is performed. Records may be somewhat abbreviated and in composite format and can be included as part of the research data collected, but must also be available for review by the IACUC upon request. Please see the example of the surgical record that is provided for your use in the ACF at the end of this document.
b) Records must identify the IACUC protocol number, the type of surgical procedure performed, the date of the procedure, the person who performed the procedure, emergency contact phone number, information on all drug administration (including anesthesia and analgesia), peri-operative monitoring, and must be maintained by the laboratory. This information must be available for review by regulatory bodies, including the IACUC.
    i) NOTE: Record MUST be legible.

11) Suture Selection

a) Close surgical wounds using appropriate techniques and materials. Use the following table as a guide to the types of sutures that are appropriate.

Suture	**Characteristics and Frequent Uses**
Vicryl®, Dexon®	Absorbable; 60-90 days. Ligate or suture tissues where an absorbable suture is desirable.
PDS®, Maxon®	Absorbable; 6 months. Ligate or suture tissues especially where an absorbable suture and extended wound support is desirable
Prolene®	Nonabsorbable, Inert. General skin closure.
Nylon	Nonabsorbable. Inert. General skin closure.
Silk	Nonabsorbable. (Caution: Tissue reactive and may wick microorganisms into the wound.) Excellent handling. Preferred for cardiovascular procedures. Must not be used to suture skin.
Stainless Steel Wound Clips, Staples	Nonabsorbable. General skin closure.
Cyanoacrylate surgical glue	Not recommended, as rodents frequently rip the glue out, along with a large area of skin, necessitating euthanasia of the animal.

12) Exceptions

a) All planned deviations from this policy must be approved by the IACUC prior to the performance of the surgical procedure. Emergency situations that involve deviations from IACUC-approved procedures must be reported to the ACF Veterinarian and the IACUC committee within one week of its occurrence.

13) Mandatory cage level surgical record

Post-Procedure Monitoring						**(additional on back)**
Procedure:				PI:		
Protocol:	Emergency Contact & phone:					
Anesthesia _____	Dose:			Route:		
	Dose:			Route:		
Analgesia: _____	date:					
	am:					
	pm:					
Antibiotic: _____	date:					
	am:					
	pm:					

Post-Procedure Monitoring		
Post-Operative monitoring must be continued for at least 5 days after a procedure, or as outlined in the Protocol.		
Date/Time	Remarks (Incision, Pain, Add'l Medications)	Initials

14) Contacts

a) IACUC – iacuc@mtu.edu
b) Contact information for ACF Staff and the ACF Director: acf-l@mtu.edu or 906-487-2878

15) Related Information

a) PHS Policy on Humane Care and Use of Laboratory Animals
b) The Guide for the Care and Use of Laboratory Animals, 8th Edition
c) USDA Policy #3 Veterinary Care

Rodent Transportation On and Off Campus

1. Personnel
    a. All animal transportation must be performed by Animal Research Protection Program (ARPP) personnel or the laboratory personnel listed on the IACUC approved animal protocol.
2. Supervision
    a. NEVER LEAVE THE ANIMALS ALONE/UNATTENDED outside of the secured animal housing facility or laboratory.
3. Transportation between on-campus buildings
    a. Transportation on campus must be between the ACF and IACUC approved satellite laboratories.
    b. Opaque transportation cages or a breathable, opaque secondary container must be used.
        i. Opaque transportation cages are provided by the Animal Care Facility and can be placed in your animal housing room upon request (acf-l@mtu.edu).
        ii. A clean transportation cage must be used each time.
        iii. All cages must meet the minimum standards for size, ventilation, strength, and sanitation as required by the Guide for the Care and Use of Laboratory Animals.
        iv. Water bottles should be removed or turned upside down.
        v. Secondary containers must be approved by the ARPP Director prior to use (iacuc@mtu.edu).
    c. A maximum of two cages per person may be hand carried, larger numbers of cages must be transported securely using a cart.
        i. Do not stack cages more than 2 high.
    d. Interior routes should be used to the extent possible. If interior routes cannot be used, cages must be protected from inclement weather (rain, snow, temperature extremes).
    e. Vehicular transportation is not recommended for on-campus transportation.
4. Transportation between campus and off-campus locations
    a. The off-campus location must be listed in an approved IACUC policy.
    b. A temperature-controlled motor vehicle must be used for transportation.
        i. Use of a Husky Motors vehicle is required.
            1. Reservations should be made in advance to ensure availability.
        ii. Animals must be transported in the passenger area of the vehicle and the interior temperature of the vehicle must remain between 68- and 79-degrees F.
    c. Cages must be secured while in the motor vehicle.
    d. Rodent cages must not be stacked more than two cages high.
    e. Rodents which are expected to be in transit for more than 4 hours must be provided with sufficient water and food.
5. Exceptions

a. The Attending Veterinarian or designee may grant exceptions to this policy when it is deemed in the best interest of the animals.
b. Concerns or issues regarding animal transportation must be reported to and will be reviewed by the IACUC.

Ulcerative Dermatitis in Rodents

1. Personnel and Purpose
    a. This SOP authorizes and outlines objective scoring and various treatment options of mice with ulcerative dermatitis by veterinary staff, investigative personnel and animal care technicians and provides criteria for determining euthanasia in severe intractable cases of ulcerative dermatitis.
2. Explanation of Ulcerative Dermatitis
    a. Etiology: The cause of ulcerative dermatitis syndrome is unknown but is likely multifactorial with an epigenetic component. Risk factors include high fat diet and certain genotypes such as E or P selectin and inducible nitric oxide synthase knockouts. Ulcerative dermatitis may be spontaneous or may occur secondary to a break in the skin, such as fight wounds or ear tags. There is no definitive cure for ulcerative dermatitis but mild cases can be managed with long-term therapeutic intervention.
    b. Incidence: Ulcerative dermatitis is common in C57BL/6 mice or strains with C57BL/6 background. Most genetically modified mice have C57BL/6 as part of their genetic background.
3. Identification and Scoring Guidelines
    a. Common clinical signs:
        i. Alopecia, pruritus, ulceration, crusting and exudation of the skin. Common location of lesions are the dorsum, cervical area, flank, between the scapulae, and behind the ears. Chronic conditions can cause ulcerated areas, scaring and contracture of the skin that leads to restriction of movement.
    b. Scoring Guidelines
        i. Mild
            1. Excoriations and/or punctuate crust(s) (≤ 2 mm**)
            2. Any ulcerative lesion ≤ 5 mm** in diameter on the body but not on face or extremities.
            3. Lesion is not characterized by scratching.
            4. Mild cases are the most likely to respond to treatment and may resolve naturally
        ii. Moderate
            1. Any lesion < 3 mm** involving the face or extremities.
            2. Any lesion that is continually scratched.
        iii. Severe
            1. Any ulcerative lesion > 1.5cm** in diameter.
            2. Multiple ulcerative lesions that add up to > 1.5 cm** in length
            3. Ulcerative lesion > 3mm** on face
4. Notification
    a. Personnel identifying the condition must notify the Animal Care Facility Director (or their designee). The Director or their designee will promptly assess the animal and notify the principal investigator.

b. The cage should be flagged with a blue “Dermatitis” flag with the date flagged, initials of the person flagging the cage, and whether the ACF Director has been notified.

5. Treatment Options
    a. Early treatment of mild cases has been shown to be more effective.
    b. Trimming of the rear toenails every 7 days.
        i. This has been shown to be very effective in the treatment of mild UD. A restraint device is strongly recommended to help facilitate proper handling of the mice for the nail trim. Use small suture removal scissors.
    c. Topical treatment options:
        i. Apply any of the topical medications listed once daily for 7 days. If the lesions improve after daily treatment for one week, then application can be reduced to 2-3x per week. Top choice is Vetericyn Plus Opthalmic Gel.
            1. Vetericyn Plus Ophthalmic Gel® (Hypochlorous Acid (0.010%))
            2. Triple antibiotic ointment (bacitracin zinc, neomycin sulfate, polymyxin B sulfate) +/- pramoxine
            3. Chlorhexidine 2% ointment or solution
            4. Silver Sulfadiazine cream 1%
        ii. All topical treatments must be noted on the cage card with the initials of the person, date, and treatment applied. See 6, Documentation.
    d. Housing:
        i. Separating affected animals can prevent worsening of clinical signs due to aggressive behavior of cage mates.
6. Documentation
    a. To initiate treatment documentation, use the back side of the cage card. Once the case exceeds one week, the ACF Director or their designee will assess treatment efficacy and develop a follow up care plan if needed or will resolve the case. When the case has resolved, either returned to normal limits, euthanasia or transferred to long term care, write the date on the front of the card.
    b. A number score should be given to each UD case and documented in the treatment section: (1) Mild; (2) Moderate (3) Severe. See 3.b for scoring guidelines.
7. Resolution of Case
    a. Affected animals that have been assessed and treated and have improvement of clinical signs where there is no active inflammation (hair loss may still be present) can be resolved and treatment stopped. Resolution of a case is determined by the Animal Care Facility Director or their designee in consultation with the attending veterinarian. Resolution date should be noted on the cage card. If the animal is euthanized place the date of euthanasia on the card.
8. Criteria for Euthanasia

a. Severe UD with score of 3 that has not resolved or improved after 10-14 days with treatment.
b. Presence of lesions which impair normal functions such as eating or drinking, locomotion.
c. Depression, lethargy, loss of body condition.
d. Every effort will be made to contact the PI and staff when animals have reached the criteria for euthanasia before the animal is euthanized.

9. Exceptions
    a. The Attending Veterinarian or designee may grant exceptions to this policy when it is deemed in the best interest of the animals.