1. **Purpose:**
This procedure provides guidelines to be followed for USDA animal surgery. USDA-covered animals include all mammals excluding rats and mice. All persons performing surgery on USDA-covered animals must complete the appropriate IACUC training classes before performing surgery.

2. **Scope:**
These guidelines apply to all surgical procedures performed on USDA animals at the CMLAF. USDA-covered animals housed in the CMLAF include: dogs, pigs, sheep, rabbits, guinea pigs, ferrets, hamsters, chinchillas, and gerbils.

3. **Procedure:**

   a. **Surgical procedures can be divided into:**
      
      i. **Non-survival surgery:**
         1. A surgical procedure in which the animal is euthanized while still anesthetized, and therefore does not recover from anesthesia.
         2. While aseptic technique is not necessary for non-survival surgery, the skin should be shaved, the surgeon should wear clean gloves, and clean instruments should be used.
         3. Appropriate anesthetics and analgesics must be used to alleviate pain or distress. Monitoring of vital signs and anesthetic plane must be performed and documented on the “Anesthesia Monitoring/Surgery/Post-Operative form”. Completed forms should be turned into the veterinary technicians’ office (room 204 BEB or CTRC 7071) or left in the after-hours drop box outside room 204 or folder outside CTRC 7071.
      
      ii. **Minor survival surgery:**
         1. A surgical procedure which does not expose a body cavity and causes little or no physical impairment. Examples of minor survival surgery include wound suturing, peripheral vessel cannulations, percutaneous biopsy, and angiograms.
         2. Minor survival surgical procedures do not require a dedicated surgical room, however aseptic technique must be used.

      iii. **Major survival surgery:**
         1. A surgical procedure which penetrates and exposes a body cavity (e.g., cranial, thoracic, or abdominal procedures), or which leaves the animal with a permanent physical or physiological impairment (e.g., limb amputation, joint replacement, enucleation).
2. Aseptic technique, as outlined below, must be used.
3. Major survival surgery on USDA animals (non-rodents) should be scheduled in the mornings from Monday to Wednesday to allow suitable time for monitoring following recovery and when full LAF staffing is present.
4. Major survival surgery must be performed in a dedicated surgical room which is maintained under aseptic conditions. Approved surgery rooms for major survival surgery of USDA-covered animals include: BEB 311, BEB 313, BRB 369 (sheep only), CTRC 7037B, and CTRC 7037C.
   a. Note: Unless an exception is specifically justified as an essential component of the research protocol and approved by the IACUC, aseptic surgery should be performed in dedicated facilities and spaces.
   b. Note: Multiple survival surgeries on USDA-covered animals are not permitted unless justified for scientific reasons by the principal investigator and approved by the IACUC.

b. Animal Preparation:
   i. Animal preparation should take place in an area separate from where the surgery is to be conducted.
   ii. Hair should be removed from the surgical site.
   iii. The surgical site should be prepped with a 3 step process: scrub the skin with disinfectant soap, followed by a 70% alcohol swab – repeated three times, and then paint the site with iodine or chlorhexidine solution.
   iv. Place a small amount of plain, sterile ophthalmic ointment in each of the animal’s eyes to prevent corneal drying.
   v. After animal preparation is complete, transfer the animal to the surgical area, taking care not to contaminate the surgical site.

c. Surgeon Preparation:
   i. For SURVIVAL surgical procedures (major and minor), the surgeon should wear clean scrubs, a surgical hat, and mask.
   ii. Surgeons should wash their hands with an antiseptic surgical scrub and dry their hands with a sterile towel.
   iii. Sterile surgical gloves and a sterile surgical gown should be worn. A sterile surgical gown is not required for surgery on USDA-covered rodents, however a clean lab coat or scrubs should be worn.

d. Anesthesia and Monitoring of Animal (Survival and Non-Survival Surgery):
   i. The animal should be maintained in a surgical plane of anesthesia, using appropriate anesthetics and analgesics, throughout the procedure. Monitoring of anesthetic depth and vital signs should be performed every 10 minutes. All anesthetics, analgesics, and monitoring should be
documented on the “Anesthesia Monitoring/Surgery/Post-Operative report”.

ii. The use of neuromuscular blocking agents (paralytics) for surgery without anesthetics is not permitted.

iii. Supplemental heat, in the form of warm water recirculating blankets, heat lamps, or forced-air warming blankets, should be provided. The use of supplemental heat should be considered for non-survival surgeries that are of prolonged duration.

iv. Supplemental fluids (Lactated Ringer’s or Saline) should be provided. Subcutaneous or intraperitoneal fluids are recommended for USDA-covered rodents, and intravenous fluids for non-rodents. The use of supplemental fluids should be considered for non-survival surgeries that are of prolonged duration.

e. Anesthesia and Monitoring of Animal (Survival Surgery):

i. All surgical instruments, supplies (e.g., gauze, Q-tips, catheters, implants), and suture materials must be sterilized. All instruments and materials should be handled aseptically. Surgical instruments should only be for one procedure, and then should be cleaned and re-sterilized. Anesthetics, supplies, and drugs must be in date (do not use expired drugs or supplies).

1. Instruments may be sterilized using steam (autoclave) or gas (ethylene oxide) sterilization.

2. Materials which cannot withstand steam sterilization (e.g., catheters) may be sterilized using a cold sterilant (e.g., glutaraldehyde), but must be rinsed using sterile saline prior to use.

3. Cold sterilants or bead sterilizers may be used to sterilize instruments for use on USDA-covered rodents only.

ii. The surgical site should be draped with sterile drapes (paper, plastic, or tightly woven cloth). The drape should cover all of the animal’s body, except for the disinfected surgical site.

iii. Appropriate suture and suturing techniques should be used. Absorbable suture should be used whenever the suture will remain in the animal’s body (e.g., in a body cavity, vessel ligations, subcuticular sutures). Non-absorbable sutures or stainless steel surgical staples, and/or wound clips should be used for skin closure, and must be removed 10-14 days later.

f. Post-Operative Care (Survival Surgery Only):

i. Move the animal to a warm, dry area and monitor vital signs every 15 minutes until the animal is fully recovered (able to stand). Never leave the animal on the table unattended. Record monitoring on the post-operative report form.

ii. Administer analgesics as outlined in your IACUC protocol, and record this information on the post-operative report form.

iii. Return the animal to its routine housing only when it has fully recovered from anesthesia (is able to stand). Identify post-operative animal cages
with a blue “Post-Operative Care Observation” card (refer to SOP 2C1) so that the veterinary staff can perform 3 days of post-operative followup care. The veterinary staff will notify the principal investigator if any post-operative problems are noted.

1. Note: Dogs and nursery swine should be returned to the step-down recovery rooms (324 A and B-dogs, at BEB and Rooms 7037A & 7041 at CTRC) instead of routine housing.

iv. Turn the completed “Anesthesia Monitoring/Surgery/Post-Operative Form” into the veterinary technicians’ office (room 204 BEB and room 7071 CTRC) or leave it in the after-hours drop box outside room 204 or folder outside CTRC 7071. Forms must be turned in on the day of surgery, when surgery is finished. Indicate on the form if any additional post-operative analgesics or treatments are required, as per your IACUC protocol, and indicate whether principal investigator or veterinary staff should administer them.

v. Examine your animal at least daily for 3 days. Examine the incision site for redness, discharge, or swelling, and ensure that the animal is eating, drinking, urinating, and defecating normally.

vi. If post-operative complications are noted, contact the CMLAF veterinary staff immediately.