



Monitoring the Effectiveness of Sanitation and Sterilization of Animal-Related Equipment

The Guide for the Care and Use of Laboratory Animals (2011) confirms the importance of regular sanitation of animal-related equipment, sterilization of surgical equipment, and establishing a means of assessing the effectiveness of these practices (see quotes on the next page). PIs are encouraged to critically assess sanitation and sterilization methods used in the laboratory, acknowledging the potential impact of inadequate practices on animal health and welfare, accuracy of results, variability in data, and likelihood of lost research productivity.

Sanitation of Research Equipment

The Research Resources Facilities (RRF) takes great care to ensure that its sanitation practices adequately clean and decontaminate materials coming in direct contact with animals. This is particularly true for Specific Pathogen Free (SPF) rodent colonies; mice, for example, are housed only in caging that has been sterilized. There are numerous methods employed to assure adequate sanitation, including:

- Careful attention to appropriate formulation and preparation of disinfectants
- Not using disinfectants after manufacturer-recommended expiration/shelf-life timeframes
- Monitoring concentrations of detergent and disinfectants in mechanical washers
- Monitoring water temperature in mechanical washers to ensure 180°F rinse cycle and using heat-sensitive indicators
- Periodic assessment of sanitation equipment and/or cleaning methods via microbiological monitoring such as RODAC plating (bacterial culture) or ATP bioluminescence

These same principles should be applied to equipment with which animals have direct contact in laboratories. The extent of sanitation needs depend on the equipment and its intended use. For example, contamination within euthanasia chambers may have little impact on the colony health status; however, soil and lingering odors can induce distress in animals subsequently enclosed there. Cleanliness and sanitation with a low-level detergent or disinfectants should suffice. Conversely, cleanliness of metabolic chambers housing animals for several hours, especially if the occupants will be returned to existing colonies, may have a significant impact on colony health status; therefore sanitation practices should be equitable to caging used in the RRF.

Principal investigators are encouraged to carefully consider methods of both sanitation and periodic assessment of the effectiveness of such practices. Considerations include the *frequency of use* and *animal exposure time* and the *need to return animals* to the vivarium. *Construction features of the surfaces* to be cleaned, such as smoothness, porosity, the presence of creases or junctions, and chemical resistance, may dictate the frequency and method of monitoring of sanitation effectiveness. The RRF is available to assist in developing recommendations, and encourages documentation of such practices.

Sterilization of Surgical Equipment

Similarly, it is important to verify that materials requiring sterilization, such as surgical instruments, are indeed sterile. The RRF recommends steam sterilization via autoclave for surgical instruments whenever possible. Methods of monitoring effectiveness include *documenting sterilization parameters* (pressure and temperature) from the autoclave itself and using *temperature-sensitive tape or strips* placed on or within packs of materials sterilized. However, it is also strongly recommended to periodically confirm that sterilization cycles are appropriate using a *microbiological method*. The most commonly-employed biological indicators use the bacterial endospores of *Geobacillus stearothermophilus*; any growth of the organism in culture following an autoclave cycle indicates inadequate sterilization. There are numerous kits using ampules or strips and mail-in services. The RRF can also provide this services for your laboratory, and, again, recommends documentation of such findings.

Pertinent Quotes from the Guide

- *In general, enclosures and accessories, such as tops, should be sanitized at least once every 2 weeks. Solid-bottom caging, bottles, and sipper tubes usually require sanitation at least once a week.*
 - *Mechanical washers (e.g., cage and rack, tunnel, and bottle washers) are recommended for cleaning quantities of caging and moveable equipment. Sanitation of cages and equipment by hand with hot water and detergents or disinfectants can also be effective but requires considerable attention to detail.*
 - *Monitoring of sanitation practices should fit the process and materials being cleaned and may include visual inspection and microbiologic and water temperature monitoring.*
 - *Whether the sanitation process is automated or manual, regular evaluation of sanitation effectiveness is recommended. This can be performed by evaluating processed materials by microbiologic culture or the use of organic material detection systems (e.g., adenosine triphosphate [ATP] bioluminescence) and/or confirming the removal of artificial soil applied to equipment surfaces before washing.*
 - *Specific sterilization methods should be selected on the basis of the physical characteristics of the materials to be sterilized and sterilization indicators should be used to validate that materials have been properly sterilized.*
 - *Sterilizers should be regularly evaluated and monitored to ensure their safety and effectiveness.*
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