Cleaning and Disinfection as Key Elements of Animal Biosecurity

By Nicole Kenny, HBSc. Assoc Chem

Disinfecting a facility is expensive. Making a poor disinfectant choice and implementing an ineffective cleaning process can add to these costs. Ensuring effective and streamlined protocols and assessing the facility type is an important first step. Within laboratory animal environments, numerous measures are employed to minimize or eradicate pathogens that can cause clinical disease and impact research. The methods can range from specialized care requirements to regular health monitoring; however, the program's overall goal is to break the chain of infection. A key player in this battle is cleaning and disinfection. To achieve compliance amongst staff, it's important to review the protocols to confirm they are optimized to reduce time, labor, and complexity.

Wet Cleaning Facilities

Implementing an effective cleaning and disinfection process will reduce labor and product consumption costs. In wet cleaning facilities, typically seen in large animal operations, there are floor drains or troughs available. In these facilities, if excessive soil loads (bedding, dust, excrement, etc.) are visible, implementation of a thorough pre-cleaning step is very important. Pre-cleaning removes visible soils, and involves a detergent solution or one-step disinfectant cleaner, mechanical action, and water as a rinse step. Cleaning is crucial as soils can impact the efficacy of disinfectants and prevent them from reaching their intended target.

Additionally, mechanical cleaning alone reduces the pathogen load by up to 2-logs (100×). Large areas require the use of mechanically assisted cleaning followed by disinfection application that involves equipment such as sprayers and foamers to reach ceilings and walls and to coat large equipment. Utilize products that have the capability to foam and cling to surfaces. These products are applied by foaming bottom to top and then rinsing top to bottom. This process will reduce product wastage and the time taken to complete cleaning and disinfection while ensuring adequate surface coverage.

Dry Cleaning Facilities

Reducing the risk of disease transmission requires that the disinfectant's required contact time is achieved.[4] In dry facilities or areas typically seen in small animal operations, there are no floor drains or troughs. This also applies to auxiliary areas such as corridors and surgical rooms. Unlike areas that allow for wet cleaning, methods of application should minimize the amount of disinfectant being applied. In these areas, protocols involve mopping floors and hand spraying/wiping the equipment and surfaces. In general, there are limited levels of soiling; therefore, a one-step cleaning-disinfection protocol suffices. However, if preferred, a separate disinfection step may be added as a preventative measure. In situations where visible soils, blood, or other animal fluids are observable, use a two-step cleaning and disinfection procedure. To minimize disease transmission and ensure the required contact time is achieved, protocols that utilize ready-to-use disinfectants or premoistened wipes that carry shorter contact times are preferred.

Application Equipment Is Key

Inappropriate use of cleaning and disinfection tools can spread disease and negate your infection prevention and biosecurity program.[2,5] A range of application equipment is available. Selection of the best tools for the facility type and usage is important. For example, wet string mops and mop buckets can harbor and spread bacterial contamination. Investigating al-

A lab animal tech applying disinfectants using a handheld pump up foamer.

A lab animal tech disinfecting a biosafety cabinet with a single-use microfiber mop system.

ternatives, such as disposable single-use microfiber mop heads, can help mitigate concerns. The disinfectant's performance can even be impacted by the substrate choice. Quaternary ammonium compounds (quat) products can become attracted to and bind into fabrics such as cotton resulting in less release of the disinfectant reaching the surface which reduces efficacy. Understanding the chemistry of the disinfectant and the most suitable substrates is necessary to ensure effectiveness.

Mechanical application equipment, such as sprayers and foamers, must be calibrated to dispense the appropriate solution and to achieve the required product contact time on the surface. For concentrated solutions, moving towards an automated wall-mounted dilution system is also key to avoid issues with hand mixing. A calibration step is similarly required to ensure the system is dispensing the right ratio. Other methods, such as test strips, can help confirm concentration.

Selecting an Ideal Disinfectant

Today's cleaning and disinfectant technologies do not help facilities effectively combat pathogens; even worse, they are a threat to human and animal health.[3,1] There are several key criteria to consider when choosing a chemical disinfectant. It is not just about cleaning ability or biocidal efficacy against pathogens on your exclusion lists. Another important consideration is the safety profile of the solution and the potential occupational health and safety risks. Ideally, the solution should be non-toxic, non-irritating, etc. Several of the most commonly used disinfectants rely on relatively high, and hence hazardous, concentrations of chlorine releasing agents, quaternary ammonium compounds, and alcohols. Many of these substances present risk of permanent eye, skin, and mucous membrane damage and some are potentially carcinogenic.[3,1]

Further, for long term cost savings, a non-corrosive and highly compatible solution can also extend the life of your valuable equipment. For example, Accelerated Hydrogen Peroxide® (AHP®) based one-step cleaner disinfectants offer the perfect balance between safety, compatibility, efficacy, long shelf life, and more which makes it an ideal disinfectant for laboratory animal facilities. Once all the components are in place, investment in the proper staff training to remain compliant and maintain the highest standards of biosecurity is key.

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