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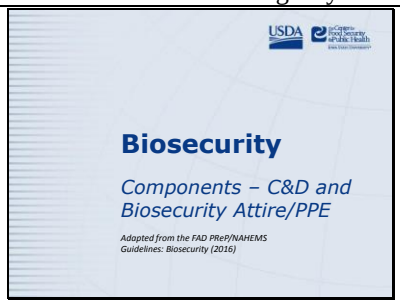

Biosecurity is a cornerstone of livestock production systems (including poultry production) to maintain food safety and security, protect the environment, and facilitate continuity of business by protecting animals and animal products. In addition to the daily protocols to protect the health of livestock populations, biosecurity is crucial in containing disease in a foreign animal disease (FAD) outbreak. Should the FAD also be zoonotic, biosecurity is necessary to protect public health. Understanding the risks of disease transmission and the necessary preventive procedures will be essential during the response. [This information was derived from the *Foreign Animal Disease Preparedness and Response (FAD PReP)/National Animal Health Emergency Management System (NAHEMS) Guidelines: Biosecurity* (2016)].

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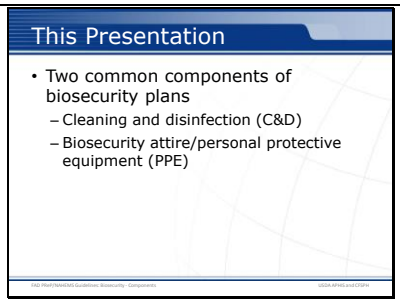

Biosecurity practices are site-specific; however, two components are part of most every biosecurity plan: 1) cleaning and disinfection (C&D) and 2) biosecurity attire, most often called personal protective equipment (PPE). This presentation will addresses how these components serve as biosecurity tools.

C&D procedures are used to reduce, inactivate or destroy biological pathogens thereby inhibiting or eliminating their further spread. Steps for general C&D processes will be discussed.

Biosecurity attire/PPE is utilized to prevent contaminated clothing and footwear from serving as fomites. In a zoonotic disease event, PPE also serves as a barrier to protect personnel from the disease agent. Although these two components are highly significant, they are only a part of a complete biosecurity plan.

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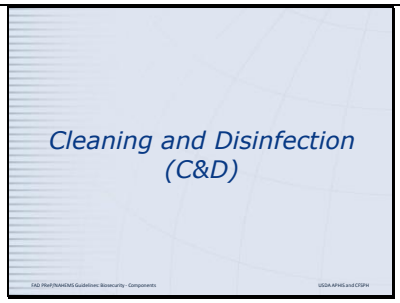

Cleaning and disinfection (C&D) are standard practices in most biosecurity plans to remove organic material and reduce, remove, inactivate, eliminate, or destroy pathogenic microorganisms. C&D in some form, and sometimes in a combination of methods, is conducted on items when moving from a dirty area (area of potential disease contamination) into a clean area (area of non-contamination), across a Line of Separation. Each type of item to be decontaminated will have a specific method and protocol. The process needs to be conducted in a systematic manner to ensure efforts are effective. The C&D process is time consuming, even for smaller items like eyeglasses and rubber boots; only essential items should cross the Line of Separation. As an alternative, choose items that can be disposed of in a biosecure manner.

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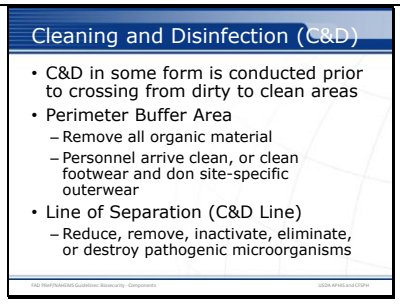

In most biosecurity plans, some form of cleaning and disinfection (C&D) is conducted before people and their clothing, equipment, supplies, and larger items such as vehicles and heavy equipment cross from dirty to clean areas. Prior to entering a Perimeter Buffer Area, which is a transitional space with reduced environmental contamination, the biosecurity plan may require that all organic material be cleaned from equipment and vehicles. Personnel may be required to shower and wear clean outerwear prior to arrival, or clean and disinfect footwear and don site-specific outerwear prior to entering the Perimeter Buffer Area. In other biosecurity plans, the Line of Separation dividing dirty from clean may serve as a convenient location for C&D activities; in this case, it may also be called the C&D Line. The plan may require thorough C&D of all items to reduce, remove, inactivate, eliminate, or destroy pathogenic microorganisms prior to crossing the Line of Separation into animal areas.

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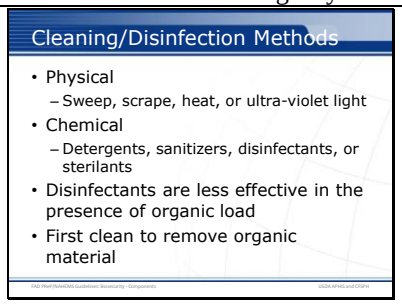

Cleaning and disinfection methods can involve the use of physical (e.g., sweeping, scraping, heating, or ultraviolet light) or chemical (e.g., detergents, sanitizers, disinfectants, or sterilants) processes. Some biosecurity plans may use a combination of processes at different critical control points, or use a combination (physical and chemical) at one critical control point. Because disinfectants are less effective in the presence of organic load, cleaning is performed first to remove organic material.

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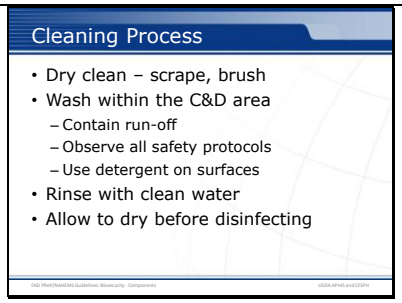

Cleaning is the first step of the process. Dry clean all surfaces before entering the cleaning/disinfection area. Scrape and/or brush to remove all visible dirt and organic matter. If using water to clean and/or disinfect, choose a convenient location to contain the run off of spent fluid and prevent it from seeping into open water, areas around nearby wells, or into "clean" uncontaminated areas. All safety protocols, including wearing appropriate PPE, need to be followed when handling, mixing and applying chemical solutions. Follow all product label instructions on the detergent and on the EPA-registered disinfectant (dilution, handling, contact time, stability, storage, and disposal). Within the identified cleaning/disinfection area, wash all surfaces thoroughly with detergent using a soft brush, cloth, or sponge. Rinse items with clean water. Allow items to dry prior to disinfection

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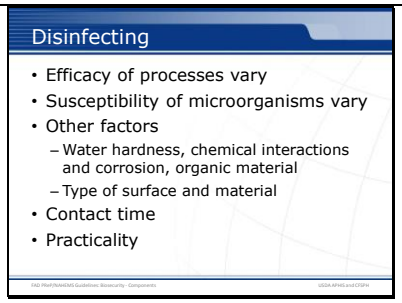
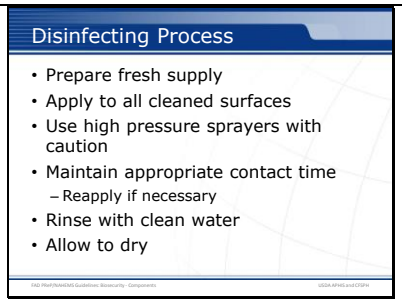


Disinfecting is the second step after cleaning. Disinfection processes vary in their level of destruction of microorganisms. Microorganisms vary in their susceptibility to disinfection. Other factors influencing the process include hardness of the water, the interaction with other chemicals, the caustic nature of some chemicals, and the effectiveness of the process in the presence of organic material. Some surfaces and materials may be damaged by certain chemicals, so choices need to be made carefully. Appropriate contact time for a disinfectant must be followed, whether the application is physical, such as heat or ultraviolet light, or chemical as a solution. Some methods are not practical for the situation. All of these are important considerations when selecting and conducting C&D activities.

Slide 8



When using a chemical solution for the disinfecting process, prepare a fresh supply of the EPA-registered disinfectant according to the product label. Apply disinfectant solution to all cleaned surfaces with a low pressure sprayer, or by wiping, or immersing the items in the solution. Use high pressure sprayers with caution to avoid further spread or aerosolization of the disease agent, and to prevent unnecessary exposure to the chemical. Ensure all areas are covered and remain "wet" throughout the necessary contact time; reapply if necessary. Rinse thoroughly with clean warm water – rinsing is essential as detergents or disinfectants dried on components may cause deterioration of rubber or metal parts if not completely removed. Allow items to air dry. Some items may be placed in the sunlight for drying and additional disinfection. Note: Alternate methods of disinfection, such as heat treatment, may be allowed; follow guidance provided by Incident Command.

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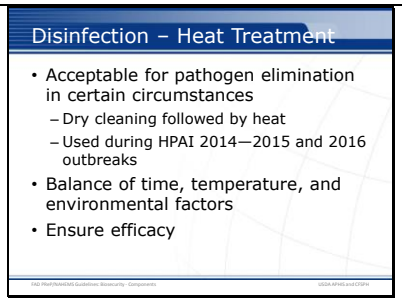
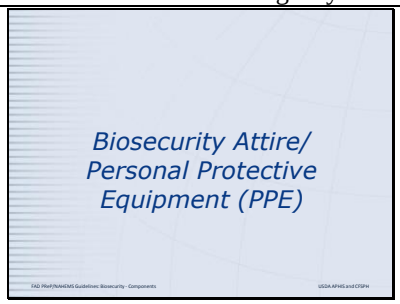


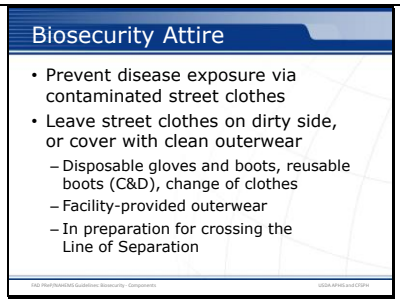
Traditionally wet cleaning and disinfection has been performed to mitigate environmental contamination. In certain circumstances, dry cleaning with heat treatment as a disinfection step has been an acceptable method of elimination of some pathogens. Heat treatment was used for virus elimination from some poultry houses in both the 2014–2015 and 2016 HPAI outbreaks and is a tested, cost-effective option. Prior to heat treatment, dry cleaning involves minimizing remaining organic material (e.g., soil, manure, bedding, feed, eggs, feathers) from all production areas and equipment. Shovels, manure forks, brooms, and brushes should be used to sweep, scrape, and remove organic debris from surfaces. Once inspected and approved, disinfection can be performed by heat treatment of the barns/houses, carefully balancing time, temperature, and environmental factors that may impact virus elimination. The process is closely monitored, documented, and tested through environmental sampling for efficacy.

Slide 10



The outer clothing worn by personnel presents a significant biosecurity risk in transferring pathogens from one location to another. The risk needs to be mitigated in day-to-day protocols, as well as in an FAD response. Biosecurity plans to prevent the introduction of disease (bioexclusion) may include the use of specific biosecurity attire. Responders in an FAD response may follow more strict protocols in donning and doffing PPE.

Slide 11



The goal in using biosecurity attire is to prevent exposure of livestock to potential contamination on street clothes, by either leaving street clothes on the dirty side, or covering street clothes with clean coveralls and footwear. Disposable gloves, disposable boots or reusable boots that can be cleaned, and a change of outer clothes may be required in preparation to enter an animal area. Some facilities may provide specific outerwear for personnel crossing the Line of Separation into animal areas and may maintain/launder this outwear on-site.

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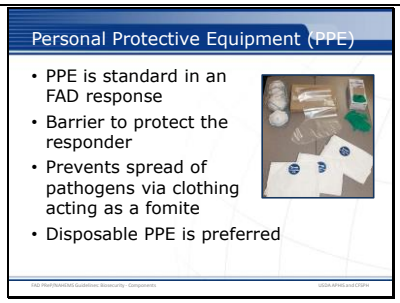
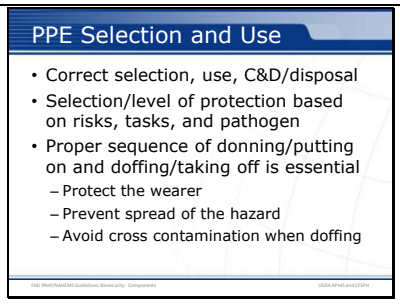


In an FAD response, personal protective equipment (PPE) is a standard tool for biocontainment. PPE in this case is intended to serve as biosecurity attire. In general, PPE is intended as a barrier to protect the user from hazards, such as biological and chemical agents, loud noises, and trauma. PPE items include impermeable outer clothing, respirators, ear plugs, and hard hats. In livestock disease events, PPE as outer clothing, along with the proper protocols, is also used to prevent the transmission/spread of pathogens via contaminated clothing. Disposable coveralls (e.g., Tyvek®), aprons, gloves, and boots, when properly utilized, prevent clothing from acting as a fomite. In an animal health emergency, disposable PPE is preferred, as opposed to outer clothing that needs laundering.
[This is a photo of various types of disposable personal protective equipment, including coveralls, boot covers, and respiratory and eye protection. Photo source: Center for Food Security and Public Health, Iowa State University]

Slide 13



Only the appropriate selection, donning (putting on), doffing (taking off), use, and cleaning and disinfection/disposal of PPE will mitigate the spread of disease, as well as properly protect the responder. The selection and level of protection is based on risks, the specific working environment, the tasks, and the pathogen. PPE needs to be donned and doffed in a proper sequence to effectively protect the wearer and to prevent the spread of the hazard. The order of donning is critical, and dictates the proper order of doffing to avoid cross contamination. The intent is to prevent the outerwear from serving as a fomite in disease spread. For additional details on the levels of PPE, and the sequence of steps for donning/doffing, consult *FAD PReP/NAHEMS Guidelines: Personal Protective Equipment (PPE).*

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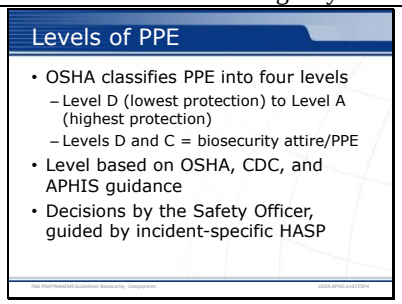
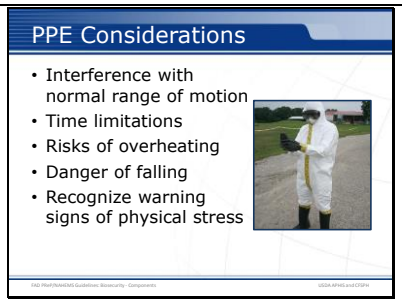


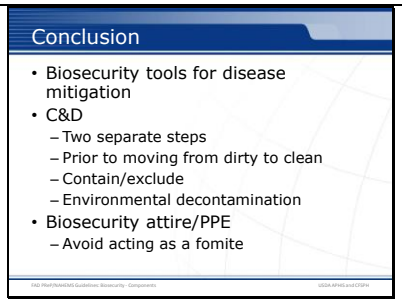
The Occupational Safety and Health Administration (OSHA) classifies PPE into four levels of protection. The levels range from D (lowest level of protection) to A (highest level). Levels D and C are most commonly used as biosecurity attire and as PPE in an FAD response, respectively. Level D includes minimal skin protection and no required respiratory protection. Work clothes, safety boots and safety glasses are part of the Level D ensemble. Level C includes skin protection, including disposable gloves, boots, and head cover. Eye protection, as with goggles or a face shield, and respiratory protection with an air purifying respirator are also required with Level C. The level of PPE for a particular disease response will be based on OSHA, Centers for Disease Control and Prevention (CDC), and APHIS guidance. Decisions will be made by the Incident Safety Officer, and direction will be provided in the Health and Safety Plan (HASP) specific for the incident.

Slide 15



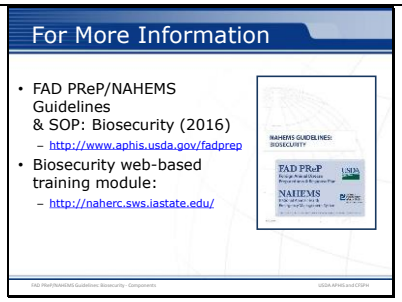
Some PPE may be bulky and interfere with the wearer's normal range of motion, making walking and other movements more difficult. Some PPE may have limitations for the duration of safe use. In addition, working in PPE can create challenges for the wearer, such as overheating. Precautions need to be taken to prevent slips and falls, and warning signs of physical stress need to be recognized. Be sure to understand and follow all established guidelines for the use and care of PPE. For more information on safety issues while wearing PPE, and other hazards that threaten responders' health, see *FAD PReP/NAHEMS Guidelines: Health and Safety*. *[This photo shows a responder in Level C PPE, which includes a respirator. Photo source: Andrew Kingsbury, Iowa State University]*

Slide 16



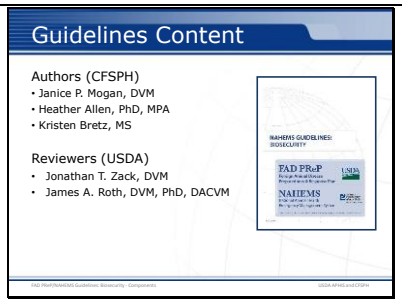
In conclusion, this presentation addresses two important biosecurity components used as tools to mitigate the spread of disease. Cleaning and disinfection are two separate steps of a process included in most biosecurity plans to 1) exclude the introduction of disease, 2) contain or prevent a disease pathogen from spreading, or 3) eliminate a disease pathogen from the environment. C&D in some form, or combination of forms, is conducted prior to moving from an area considered dirty into an area considered clean. The use of biosecurity attire or PPE is a mitigation strategy to prevent outerwear or street clothing from serving as a fomite to transfer disease.

Slide 17



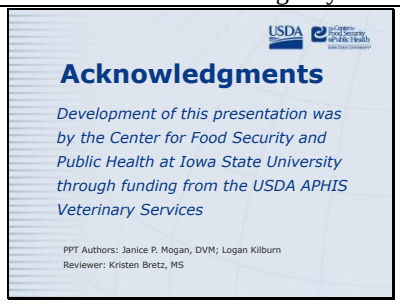
More details can be obtained from the sources listed on the slide, available on the USDA website *(http://www.aphis.usda.gov/fadprep*) and the National Animal Health Emergency Response Corps (NAHERC) Training Site (*http://naherc.sws.iastate.edu/*).

Slide 18



The print version of the Guidelines document is an excellent source for more detailed information. This slide acknowledges the authors and reviewers of the Guidelines document. It can be accessed at *http://www.aphis.usda.gov/fadprep*.

Slide 19



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