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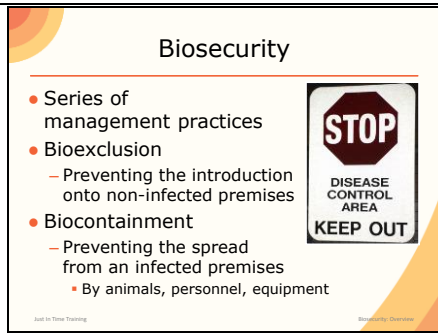


December 2015

During an animal health emergency, controlling the spread of disease to other animals, premises and responders will be necessary. This Just-In-Time training presentation will discuss the concept of biosecurity and procedures to use during infectious animal disease outbreaks.

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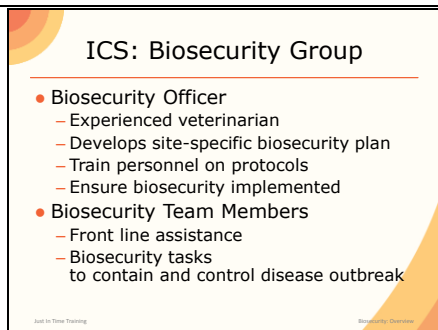
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Biosecurity involves a series of management practices designed to prevent the introduction and spread of disease causing organisms onto or off of an animal production or housing premises. There are two main goals of biosecurity. The first is bioexclusion, or preventing the introduction of disease onto a premises considered non-infected. Biocontainment involves preventing disease spread off a premises considered infected. The level of biosecurity and protocols implemented will vary with each situation and will be based on a site assessment and the potential routes of exposure for the disease of concern. Regardless, the use of various biosecurity measures, when properly implemented, will help reduce the risk of disease spread by the movement of animals, personnel, equipment and other materials during response activities.

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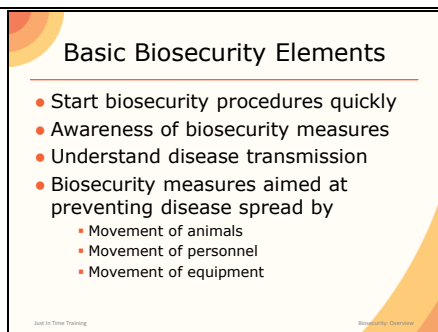
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Biosecurity procedures for an animal health emergency are coordinated and managed by the Biosecurity Group of the Operations Section of ICS. A Biosecurity Officer should be appointed and should be an experienced veterinarian or consult with one. The Biosecurity Officer will be responsible for developing a site-specific biosecurity plan (in coordination with the Incident Commander and Safety Officer), training personnel on biosecurity protocols, and ensuring the appropriate biosecurity measures are implemented. Biosecurity Team Members will provide front-line assistance in containing and controlling the disease outbreak. All responders should receive a biosecurity briefing upon arrival to the incident site.

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During an animal health emergency, it is important to start biosecurity procedures as quickly as possible. Basic elements of any biosecurity plan include an awareness and understanding of the importance of biosecurity measures and how disease agents can be transmitted. Biosecurity measures needed will be aimed at preventing disease spread from the movement of animals, personnel, and equipment.

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Disease Transmission

- Direct
 - Contact
 - Ingestion
 - Inhalation (aerosol)
- Indirect
 - Fomites
 - Inanimate objects
 - Vectors
 - Living organism (e.g., insects, rodents)



Biosecurity measures help to break the disease transmission cycle; therefore, understanding the way animal disease can be transmitted can provide insight in the necessity of biosecurity protocols. The spread of disease can occur by direct and indirect transmission methods. Direct spread of a disease may occur through direct contact with an infected individual, ingestion of the organism, or through inhalation (or aerosol) exposure. Indirect methods involve fomites – or inanimate objects that can transfer pathogens, such as boots or equipment, or involves vectors – living organisms able to transmit pathogens – most commonly insects, but also rodents or birds.

Greater explanation on the routes of disease transmission for animal disease emergencies is provided in the *Biosecurity: Routes of Transmission* Just-In-Time training presentation and handout, which can be found on the Just-In-Time training website (www.cfsph.iastate.edu/Emergency-Response/just-in-time-training.php) or by searching “animal disease just in time training”).

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BIOSECURITY MEASURES

- Movement control and restriction
- Personal protective equipment
- Cleaning and disinfection
- Isolation
- Vector control

Let’s look at the various biosecurity measures that can be used to control and prevent the introduction of pathogens onto or off of a farm. These include movement control and restriction for animals, vehicles and personnel; the use of personal protective equipment; cleaning and disinfection, isolation of animals, and vector control measures.

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Movement Control: Animals

- Stop movements
- Movement restrictions
- Animals should not be moved if
 - Came from a confirmed or suspected premises
 - Had contact with infected or suspect animal
 - Are susceptible animal near infected or suspected premises
 - Found on transport vehicles that do not meet biosecurity standards

Movement control and restriction efforts will be necessary to minimize the spread of pathogens by any number of items, including infected animals, vehicles on site, and even response personnel. Depending on the situation, this may involve complete movement restrictions (i.e., stop movement orders) or restrictive measures which may allow limited movement following biosecurity protocols (such as cleaning and disinfection). During highly contagious disease outbreaks, the movement of all affected or susceptible animals on the premises should be restricted until the scope of the outbreak can be determined. Movement restriction measures should include:


- Any animals that came from a premises confirmed or suspected of the disease;
- Any animals that have had contact with infected or suspected animals;
- Any susceptible animals near an infected or suspected premises; or
- Any animals found on transport vehicles that do not meet biosecurity standards (e.g., proper C&D measures).

Veterinary evaluation and any necessary biosecurity measures should occur for any of these situations before movement is allowed.

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Movement Control: Personnel

- Restrict access
- Control movement on and off premises
- Post highly visible signage
 - Describing biosecurity protocols
 - Designating PBA and LOS work zones
- Log book for those allowed to access
- Post signs at premises boundary




Movement control and restrictions should also be applied to people entering and exiting the infected or suspected premises. This includes responders as well as employees, or any other visitors allowed on site, such as feed delivery personnel. Access to the premises should be restricted to only those necessary for farm functions or response procedures. Movement onto or off of the premise should be tightly controlled and biosecurity measures communicated and implemented prior to entry and upon exiting the premises. A log book should be maintained to record individuals and vehicles accessing the premises. The use of warning or restriction signs at the premises boundary can be helpful in informing visitors to stay away. [Graphic illustration by Clint May, Iowa State University]

Slide 9

Movement Control: Vehicles

- Potential fomite transfer
- Park in designated areas away from animal locations
- Clean and disinfect before entering and exiting premises




Vehicles can serve as fomites and transfer pathogens to additional locations if proper biosecurity measures are not taken. Responders, employees, or visitors should park their vehicles in a designated area away from animal housing locations. This will help to prevent possible contamination of vehicles and fomite transmission of the disease. Any vehicles or equipment allowed on the premises must be cleaned and disinfected before entering and before exiting the premises to prevent potential spread to additional locations. This includes animal transport trailers or trucks, delivery trucks, personal vehicles or any other response vehicles entering the site. Individuals should put on clean and disinfected footwear, if leaving the vehicle is necessary. [Photo (top) from Bryan Buss, Iowa State University; (bottom) Carla Hueston, Mississippi State University]

Slide 10

Personal Protective Equipment

- Two functions
 - Prevent further spread
 - Protect responders
- Don PPE prior to entry into area
 - Disposable Outerwear
 - Tyvek® coveralls, gloves, boot covers, masks
 - Reusable Outerwear
 - Cloth coveralls, rubber boots, goggles
- Wear clean and disinfected footwear and outerwear



The use of Personal Protective Equipment, or PPE, can also serve as a useful biosecurity measure to prevent the spread of disease agents. Personal protective equipment serves two functions during an animal health emergency response. First, it can help minimize the spread of pathogens off of a premises, as well as between locations on a premises. PPE items are donned prior to entry to the site and doffed prior to exiting the site, thereby containing any contamination at the location. PPE also serves as a protective barrier to responders in situations involving zoonotic disease, thereby protecting the responder from potential exposure. The appropriate PPE required for a response will be determined by the pathogen involved and protective measures needed. [Photo from Jane Galyon, Iowa State University]

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Personnel Biosecurity


- Once on infected premises, do not exit until
 - PPE cleaned, disinfected
 - Disposable items left on premises or placed in designated area
 - Clean/disinfect reusable items on site
- WASH HANDS!

Once a worker has entered the infected premises, they should not exit the premises until all PPE has been properly cleaned and disinfected or disposed of prior to exiting the premises. All contaminated disposable items (e.g., Tyvek coveralls, boot covers, latex gloves) should be discarded in a plastic garbage bag to be left on the premises or in the designated area. Contaminated cloth coveralls and rubber boots should be scrubbed to remove dirt and debris and then sprayed with a disinfectant. The items should be placed into a clean plastic garbage bag or other container that is sealed until they can be washed further. Hands should always be washed after doffing all PPE.

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Cleaning and Disinfection Procedure

- **Cleaning**
 - Remove all organic matter
 - Wash and rinse
- **Disinfection**
 - Use proper concentration
 - Allow proper contact time
 - Read safety precautions
 - Wear appropriate PPE
- **All equipment or vehicles must be cleaned and disinfected**




Just In Time Training | Photo: Danelle Bickett-Weddle

Cleaning and disinfection procedures will be vital for controlling and containing any disease outbreak situation and minimizing the transmission between premises. C&D procedures should be established for animal housing areas, as well as any vehicles, equipment and PPE used on the site. The proper cleaning and disinfection procedure is a 2-step process. Cleaning involves the physical removal of any organic material such as manure, dirt, feed, or bedding, followed by a Wash step to clean surfaces and remove any adhered debris, residual oils or body fluids. The cleaning step is often overlooked; however, most disinfectants are inactivated by organic material, thereby making the cleaning step an essential part of the process. Once the area or item has been cleaned and rinsed, an appropriate (EPA-approved) disinfectant can be applied. There are various disinfectant products, application methods and use concentrations; therefore always read the label instructions for proper use. Another often overlooked step is not allowing for the proper contact time after application of the disinfection solution. The chemical disinfectant needs time to do its job, so it should remain on the surface being disinfected for the necessary time according to the product label. All chemical disinfectants have some degree of hazard with use, so always read the safety information on the label and wear the appropriate PPE when preparing and applying products. [Photo source: Danelle Bickett-Weddle, Iowa State University]

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Isolation

- Infected or exposed animals should be housed in separate areas
- Proper carcass disposal of euthanized or dead animals



Just In Time Training | Photo: Bryan Buss

Additional biosecurity measures necessary to minimize the spread of pathogens from the premises include isolation procedures and wildlife and vector control measures. The isolation of infected or exposed animals is necessary to minimize the transfer of pathogenic agents to other susceptible animals on the site or additional locations. Isolation areas should preferably be at a distance from susceptible animals if possible. Additionally, in the event of animal death or euthanasia, proper carcass disposal methods should be used to prevent animals or tissues from being carried off by wildlife. For additional information proper carcass disposal methods, see the *Carcass Disposal During Animal Health Emergencies* Just-In-Time training presentations. [Photo from Bryan Buss, Iowa State University]

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Wildlife Control

- Wildlife can carry diseases on and off the property
- Keep animals isolated from wildlife contact
- Ensure boundary measures are checked regularly and maintained
- Store food in a way that does not attract wildlife


Just In Time Training | Photo: Danelle Bickett-Weddle

For some diseases, wildlife may carry disease agents on and off of the property and infect additional susceptible animals. Wildlife can pose a difficult problem to biosecurity, especially on premises where livestock are not kept in an enclosed area. Keep infected, suspect or susceptible animals in areas that prevent wildlife contact. Boundary fences and barriers should be checked regularly and maintained. Ensure feed is stored in a manner that does not attract or allow access to wildlife (e.g., secure containers or building).

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Vector Control

- Source reduction
 - Prevent egg laying
 - Minimizing long vegetation (e.g., mowing)
- Control adults
 - Insecticides
 - Spraying, fogging, baiting
- Minimize animal interaction
 - Screens on buildings
 - Animal treatment



Some animal health emergencies will involve insect vectors (e.g., mosquitoes, biting midges) capable of spreading disease agents. Control measures should be taken to limit the spread of disease by these insects. Vector control begins with an understanding of the insect’s life cycle, as these can vary among vectors, as will effective control measures. For instance, egg laying grounds for flies are different than those of mosquitoes or midges. Controlling adult insects often involves the use of insecticides; fogging and baiting may also work to a limited extent. Most effort should be focused on reducing the vector source (i.e., egg laying sites) and limiting the exposure of animals on the premises (e.g., through the use of screens on barns, animal treatment with approved chemicals, and minimizing tall vegetation or standing pools of water). Additional information on Wildlife Management and Vector Control during animal health emergencies can be found on the Just-In-Time training website. [Photo source: Danelle Bickett-Weddle, Iowa State University]

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BIOSECURITY LINES AND WORK ZONES

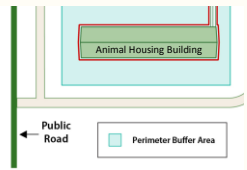
- Perimeter Buffer Area (PBA)
- Line of Separation (LOS)
- Biosecurity Work Zones

Lastly, let’s look at some of the terminology and biosecurity designations that will be used during an animal disease emergency response. These designations help establish various biosecurity areas and the protocols needed. These include the Perimeter Buffer Area, or PBA; the Line of Separation, or LOS; and Biosecurity Work Zones.

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Biosecurity Lines

- Perimeter Buffer Area (PBA)
- Line of Separation (LOS)



On-site, biosecurity lines are established to act as a barrier to reduce the spread of disease on-site. These biosecurity lines consist of the Perimeter Buffer Area (PBA) and Line of Separation (LOS). This diagram shows an animal housing building in green with the PBA in light blue shading and the LOS as a red line around the production barn.

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Perimeter Buffer Area (PBA)

- First Line of Defense
- Outer control boundary
 - Around premises or building perimeter
 - Designate PBA
 - Fencing, flags, ropes
 - Non-essential vehicles should not enter
 - Vehicles and equipment that are not cleaned and disinfected should not enter
 - Personnel training

The Perimeter Buffer Area acts as an outer control boundary. It is set up around the perimeter of the premises or building to reduce the potential for contamination of the area around the buildings. It may be an actual barrier, such as a perimeter fence or it may be marked by flags, ropes or other markings. The PBA is the first line of defense to protect the animals housed on-site. Non-essential vehicles should not enter the PBA; those allowed to enter must be cleaned and disinfected before entering. Personnel (responders, employees, truck drivers) should understand the purpose and boundaries of the PBA and be trained on procedures to follow when entering and moving around the site.

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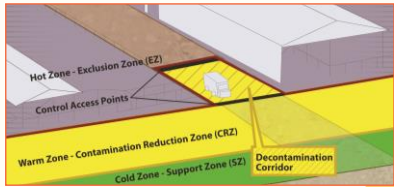
Line of Separation (LOS)

- Building walls separating animals from outside, AND
- Clearly marked line at entry site of building
- Cleaning and disinfection protocols must be completed prior to movement across the LOS (entry and exit)

Once inside the Perimeter Buffer Area, the Line of Separation is established to isolate animals from potential disease sources. The LOS consists of the building walls separating the animals from the outside, plus a clearly marked line in the entry site of the production building. The LOS can be clearly marked with tape, paint, or signage. The LOS entry should include a bench or low physical barrier as an additional indicator. A site may have as many Lines of Separation as there are buildings. All equipment and supplies that cross the LOS must be cleaned and disinfected, or be from a known clean source, this includes personnel footwear and outer clothing.

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Biosecurity Work Zones



Biosecurity Work Zones further enhance access control procedures (e.g., entry, exit) in efforts to minimize the spread of pathogen onto or off of an infected or suspected premises. Responders should understand the location and implications of each of the biosecurity work zones. These work zones apply to personnel and vehicle traffic onto the site as deemed necessary.

- The **Hot Zone or Exclusion Zone (EZ)** is the potentially contaminated or unsafe area (e.g., infected animal premises). Appropriate PPE must be worn in this area.
- The **Warm Zone or Contamination Reduction Zone (CRZ)** is also considered a high risk area due to the potential for exposure to pathogens and chemical disinfectants. All personnel are required to wear PPE.
- The **Decontamination or Decon Corridor** is the area between the Hot Zone and the Warm Zone. Decontamination of personnel and disinfection of equipment occurs here. Teams exit and enter the site through this corridor. Once responders have doffed, disinfected, and decontaminated in the Warm Zone, they should move to the Cold Zone/Support Zone (SZ) through the designated **Control Access Points**.
- The **Cold Zone or Support Zone (SZ)** is the clean/uncontaminated area of the site, where responders should not be exposed to hazardous conditions; support functions are based here. Donning of PPE prior to entry into the Hot Zone also occurs here.

[Graphic Andrew Kingsbury, Iowa State University. Definitions from USDA FAD PReP Guidelines].

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Resources

- USDA Foreign Animal Disease Preparedness (FAD PReP) Guidelines: Biosecurity
– http://www.aphis.usda.gov/animal_health/emrs/nahems.shtm
- Poultry Biosecurity Officer Information Manual
– <http://www.poultrybiosecurity.org/>
- Additional Just-In-Time Training
– <http://www.cfsph.iastate.edu/Emergency-Response/just-in-time-training.php>

For more information on biosecurity issues during an animal health emergency response, consult the USDA FAD PReP Biosecurity Guidelines or the Poultry Biosecurity Officer Information Manual. Additional training presentations, including disease routes of disease transmission, animal carcass disposal, cleaning and disinfection, and wildlife and vector control, can be found on the Just-in-Time training website.

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JUST IN TIME TRAINING

Acknowledgments

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