CHAPTER 13

Biosecurity: Protecting Animal Agriculture Poultry Production

Julie D. Helm, updated 3/6/09

What is Biosecurity?

Bio-security literally means -- life protection. Whether it is seen as protecting the life of your flock or as protecting your flock from biological diseases, the end result is the same: keeping your flock healthy. Biosecurity is specific operational steps to stop diseases from entering your farm or once a flock is infected, stopping it from spreading to other houses on the farm or to other farms. And lastly, biosecurity is the responsibility of everyone involved in the industry and every one must play fairly or there could be a lot of losers.

A good biosecurity program will assist the grower/farmer in obtaining optimal production levels by minimizing the negative effects of routine diseases and can save a flock from depopulation due to a foreign animal disease (FAD), such as High-Path Avian Influenza (AI) and Exotic Newcastle Disease (END).

All too often we undervalue the importance of biosecurity. We either forget or get too lazy to follow the daily procedures and start to rely more on other means (e.g. intense vaccination programs or antibiotics) to stop diseases. In today's production world there is a push to reduce antibiotic usage. There are less FDA approved drugs available for use and consumers are demanding "drug-free" products. Once the drugs are gone, we are back to basic management and good biosecurity practices to keep our flocks healthy from disease problems that vaccination programs don't touch. This is especially true for FAD, where there is no preventative vaccination program and the only protection your flock will have is keeping the diseases out.

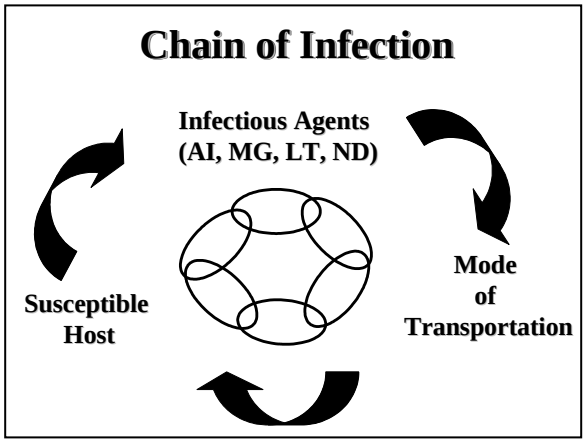
Biosecurity Today

Biosecurity practices have been around for a long time and cannot be ignored nowadays. The success of the poultry industry has led to an increase in production and an increased risk of spreading disease. Acceptable practices in the past can produce higher levels of risk today, which are no longer acceptable.

Bioterrorism or Agroterrorism, when agriculture is the target, is a real possibility. High-Path Avian Influenza or Exotic Newcastle Disease in our flocks would shut down our industry and impact our state's economy. These and other FADs found in other countries could be transported here and be introduced onto our farms.

We believe that following stringent biosecurity practices could save your flock by reducing the risk of disease infection whether by accidental or intentional introduction.

Chain of Infection



Diseases don't materialize out of thin air. Disease producing agents need to follow a complete circle or "Chain of Infection" in order for them to get to the birds and then cause illness and death in the birds.

The Chain of Infection consists of Infectious Agents (pathogens) that cause disease, the Mode of Transportation that brings the pathogen to the birds, and the Susceptible Host in which the pathogen infects.

Infectious Agents – some pathogens have a reservoir where they normally thrive. These reservoirs can be domestic poultry (chickens and turkeys for Newcastle Disease) or wild birds (waterfowl for Avian Influenza). In today's modern poultry industry with high bird densities, we have created larger populations of susceptible birds and larger populations of reservoir birds.

Mode of Transportation – pathogens can get into your flock through multiple sources. Replacement animals, people, vehicles and equipment are the worst culprits since they can transport pathogens great distances in a short period of time. Pathogens coming through pests, feed, water or air, are less common, but still do occur.

- Replacement animals
- People
- Vehicles
- Equipment
- Pests (rodents, insects, wildlife)
- Feed, Water, Air

Susceptible Hosts – are birds that can get the disease from the pathogens.

Breaking any part of the Chain of Infection will reduce the risks to your flock. The goal is to isolate the farm to keep any infectious disease from entering or leaving the premises. The Key Areas in Biosecurity include:

- Traffic Control
- Pest Control
- Dead Bird Disposal
- Cleaning & Disinfection
- Susceptible Birds
- Communication

Biosecurity Basics

Customize a program for your farm – this will be determined by the type of unit you operate (hatchery vs. grow-out farm vs. breeder farm, etc.) and the risk levels in your area (commercial or backyard poultry farms near your farm, number of employees, location near a processing plant or poultry auctions).

Do it **RIGHT** the first time and every time – "Every Day is Biosecurity Day!" Everyone tends to become lax in their biosecurity practices when there are no disease outbreaks. Then after an outbreak begins (LT, Avian Influenza, Exotic Newcastle Disease), everybody suddenly remembers the importance and starts getting strict again…..until the outbreak is over. But if you are one of those first infections in an outbreak because you were lax, the strict practices afterwards won't help your flock or your bottom line.

Biosecurity is a process – it requires objectives, procedures and a way to monitor it to ensure the objectives are met. The procedures should be written down and everyone informed who is involved with the unit.

Traffic Control

Traffic Control is the most beneficial of all of the steps and can be the least costly to perform. In essence, control the movement of people and machinery in and out of your facilities. Remember people are one of the greatest risks of spreading disease .

Take a look at all the animals, people, vehicles and equipment that move on and off your farm: replacement birds, growers, employees, flock supervisors, veterinarians, other producers, vaccine crews, loadout crews, cleaning crews, partial pick-up crews, insemination crews, utility personnel, meter readers, etc.

Take a look at all the vehicles that may move from farm to farm: chick/poult buses, supervisor's/veterinarian's trucks, livehaul trucks, litter trucks, feed trucks, egg trucks, renderer trucks, trash trucks, utility trucks, etc.

People should enter your farm with a good reason and with your permission. Restrict easy access to your farm with gates and fences or locked doors. Place signs that state: "Restricted Area, No Admittance".

Visitors – which include about everyone on the people list other than yourself and your employees, should only enter after following the proper biosecurity measures. If your rules are to wear coveralls and boots, then everyone visiting does so from the flock supervisors to company CEO's to contractor & utility workers. Keep a Visitor's Log of their name, phone number and the last time they had contact with poultry. The log can help to pin point the movement of disease spread during an outbreak.

Farm Employees – should at least wear clean work clothes and footwear everyday. It is better to supply your employees with "farm" clothes/coveralls and footwear that they only wear on the farm and change out of when leaving. Employees should have no contact with other birds (commercial/backyard poultry or pet birds) outside of their work.

Feet – Our footwear are able to spread disease agents. Provide disinfectant foot pans at the entrance of bird areas or provide footwear (galoshes) that are only worn in that house and left outside the door when leaving to the next house. Foot pans must be maintained properly in order for the disinfectant to actually kill any pathogens on the footwear. It must be changed routinely (at least daily depending on use) and the organic material may need to be removed from the footwear first with water or a brush before using the foot pan.

Vehicles – should be parked away from the birds unless they are needed to load or unload the birds. We have become lazy and routinely park our vehicle right next to the entrance door. It is easy to spread pathogens like Infectious Laryngotracheitis (LT) and AI from farm to farm on contaminated tires or wheel wells. This has happened in past outbreaks. Tires and wheel wells may be sprayed with disinfectant when leaving the farm and all vehicles and trucks in use in the operation should be routinely cleaned.

Other Growers/Farmers – Consider reducing the number of farmers who visit your farm from another farm.. If you must share between farms, clean and disinfect (C&D) vehicles and equipment in between farms. You and any employees shared, should change out of their "home farm" clothing, footwear and hats. Separate equipment, vehicles, clothing and employees between farm units (e.g. dedicated equipment for turkey brooder and grow-out units). Moving pathogens from older to younger birds with an immature immune system is a perfect way to infect the young flock.

International Travel -- If you travel to another country you may not know what types of exotic diseases their birds may have and mistakenly bring back home to your own flock. If you have any contact with foreign flocks, you should not go near any types of birds back home for at least 5 days. Thoroughly clean all travel clothing, shoes and equipment after returning home.

Pest Control

Pests include rodents, insects, wildlife and even pets. Pest control is more than just placing out bait. If in your normal pest control routine, you are still racing the rats to the end of the house, something's not working. You need to establish a formal program and monitor it regularly….and then change when needed.

Rodents (mice, rats) – can carry diseases like *Salmonella*. Use proper baiting chemicals and techniques depend on the type of unit you have. Rodents hate to be exposed to the open, keep the grass around the houses short and clean up the garbage. Details on rodent control are listed in the Chapter 10 - Vectors.

Insects (flies, darkling beetles, mosquitoes) – can be mechanical carriers of disease like *Salmonella*, Marek's Disease and Infectious Bursal Disease. Ponds are breeding grounds for mosquitoes and other biting insects which can carry Fowl Pox. Details on insect control are listed in Chapter 10 - Vectors.

Wildlife (wild song birds, waterfowl, raccoons, possums, skunks) – wild birds can carry diseases like *Salmonella* and Avian Influenza. Don't allow wild birds to build nests in or around your houses. Ponds also attract wild waterfowl, which are natural reservoirs for AI. Bird hunters need to keep their hunting clothes and dead game away from their resident birds. Raccoons, possums and skunks can become infected with AI as they share the waterfowl's habitat.

Pets (cats, dogs) – can even carry diseases like Fowl Cholera in their mouth, infecting birds if they are allowed near them to bite. Cats used as mousers inside the houses can actually infect a new flock of birds with Fowl Cholera if they were not removed or treated when the previous infected flock was removed.

Feed & Water

Feed – use good quality feed and keep it dry to avoid mold growth. Moldy feed can produce toxins which are harmful to the birds or could cause feed refusal. Clean up feed spills to not attract wild birds or rodents.

Water – Test well water for metals and bacteria levels to see what your baseline is and what kind of well treatment may be needed. Wash and disinfect open drinkers daily to prevent bacterial build-up. Avoid using pond water as your bird water source, because of the wild waterfowl and AI risk.

Dead Bird Disposal

On-Site Disposal (burial, composting, incineration) – is preferred to removing dead birds off of the premises for disease management. What ever method you use for daily mortality, be sure to get your on-site Mass Burial Site approved by DHEC or another near-by site approved. This is required for SC DHEC permitted animal facilities (poultry, swine, dairy). Call your SC DHEC District/Regional EQC Office or 803-898-4225. Do not count on the landfills taking in Avian Influenza infected birds after the media coverage of "Bird Flu". If your entire farm has to be depopulated at once, where would they go? Details on proper procedures for disposal are found in Chapter 8 – Dead Animal Disposal.

Off-Site Disposal (landfills, rendering) – is not preferred due to the increased risks of taking infected birds off of the premises or your risk of contamination from a disposal site used by multiple growers. If you must use a landfill or central disposal location used by other growers, deliver your birds at the end of the day after you are done seeing your birds and C&D your vehicle's tires and wheel wells after leaving the disposal site. If you use a rendering service to pick up your mortality, place the pick-up containers away from the houses and away from the main farm entrance. The rendering service truck should use another side driveway so that they

don't track pathogens onto the driveway you use to service the birds. Report any leaky rendering trucks.

Cleaning & Disinfection

Cleaning & Disinfection (C&D) – any organic material left inside or outside the house, can be a reservoir of infection for your next flock, including dust, down, dander, feathers, eggs, manure particles, feed, dead birds, etc.

C + D = 3….. Cleaning and Disinfection is a 3 step process: Remove, Wash & Disinfect. Removing loose material and cleaning the surface is 90% of the process. Disinfection is only 10% of the process to sterilize the clean surface. You cannot disinfect poop or dirt.

Cleaning – begins with the removal of debris, manure and dead birds far away from the houses. Manure handlers or brokers should not spread manure next to poultry houses, this is another way to spread disease long distances from the source. The inside and outside of the house itself should be thoroughly cleaned: curtains, cages, vents, fans, feed lines, augers, tanks, water lines, belt lines, etc…plus any other equipment or vehicles that were used during the last flock.

Wet Cleaning vs. Dry Cleaning – may depend on the type of equipment you have in your house (caged layer house vs. broiler or turkey grow-out) and the damage excess water could do. Either type of cleaning is acceptable and works, as long as you remove **all** organic material before disinfecting. It may take more "elbow grease" with dry cleaning. Power washing the surface without a cleaning detergent is not complete and can still leave organic material with pathogens behind. Make sure your cleaning detergents are compatible with the type of disinfect you will use afterwards. It is also best to have the cleaned surface completely dried before applying the disinfectant as a wet surface can dilute the chemical and the process of drying itself will help to reduce the pathogen numbers on the surface.

Disinfection – since some chemicals can be damaging to your equipment or harmful to yourself, find out the best type of disinfectant you can use on which type of equipment or housing from your equipment supplier and integrator.

Common types of poultry disinfectants and their uses include:

- Chlorine - water sanitizing, processing plants, boot washing
- Iodine - water sanitizing, egg sanitizing
- Quaternary ammonium - incubators, hatcheries, wash houses, feed bins, egg dipping, waterers, feed pans
- Phenol - floors, walls, soil, litter, tables, foot baths
- Cresols - floors, walls, soil, litter
- Formaldehyde - floors, litter, environmental fumigation

Comparison of activity of different types of disinfectants:

Type	Irritating	Corrosive	Active in Organic Material	Prefers pH
Chlorine	Yes	Yes	No	Acidic/Low
Iodine	Yes	Yes	No	Acidic/Low
Quats	No	No	Reduced	Basic/High
Phenol	Yes	Slight	Yes	Acidic/Low
Cresols	Yes	Yes	Yes	
Formaldehyde	Yes**	Yes**	No	

Susceptible Birds

Vaccination – programs work to prevent disease if used properly, using the correct type and dose determined by the risk of that disease in the area.

Zone Raising – is growing the same type of bird or placing the same ages of birds on several farms throughout an area. This lessens the risk of spreading disease between different types of production (caged layers and broilers) or reduces the risk of spreading disease from older flocks to younger flocks.

All In – All Out Systems – has its advantages over multi-age farms due to the complete absence of birds that can serve as reservoirs of disease to other birds.

Downtime – is the time between when the last flock left and a new flock enters, and on average is about 2 weeks. This is a time-out for the farm to properly C&D the facilities and equipment and to get on top of rodent/insect control. It is more important **WHAT** you do during this time, than the actual time period itself. You want to create hazardous living conditions for pathogens.

Communication

Communication – is the most important key to a biosecurity program, because without proper communication between growers, employees, company, state and federal personnel, etc. the wall of protection can break down.

At the Top Level – Management needs to work with Industry through Associations, Universities and Publications to determine the best procedures to use as a complete biosecurity program.

At the Regional Level – be informed of the disease problems in your area and learn how to fight them with new developments that are always evolving in poultry health.

At the Farm Level – know what's going on in your area. Follow your biosecurity rules and report rule breakers.

References

The majority of this chapter was taken from the U.S. Poultry & Egg Association's Poultry Disease Risk Management: Practical Biosecurity Resources CD.
Free CD's are available at www.poultryegg.org

Reeves, David E. Biosecurity for Commercial Swine Units - Avoiding Common Pitfalls. Proceedings of 1998 National Pork Producers Council, 1998.

Wages, Dennis P. "Poultry Sanitation and Disinfection" handout, 1996.

Thanks to critical critique from Drs. Donna Kelly, Kristi Scott, Ron Prestage and Sam Christenberry.

Routine Biosecurity Measures for Visits to Animal Related Facilities

Biological security measures should be considered standard operating procedures in all animal sectors. These controls are meant to minimize the risk of disease introduction and spread. Control measures will vary according to type of operation and location of site. Personnel working with livestock, poultry, companion, exotics and other animal industries must take steps to ensure a reasonable level of biosecurity is practiced in order to protect themselves, producers and the industries. Commercial company personnel and growers must avoid any contact with livestock markets and noncommercial livestock and poultry.

The steps outlined below are the minimum standards that should be followed by people conducting visits to farms or any other animal related facilities. Owners and producers may require more stringent biosecurity measures that should be followed accordingly, including confinement units requiring shower-in / shower-out at entry and exit respectively, etc.

If there is an outbreak of a highly contagious disease refer to the prevention and rapid response plan and individual company policies for increased biosecurity measures.

Biosecurity Levels

Routine levels of biosecurity are described below depending on the amount of contact there is with animals or their environment. Pre-plan the needed supplies and clothing required for each biosecurity level. These steps should be repeated for each premise that is visited. When in doubt as to which level of biosecurity is needed, choose the higher level.

- Level 1 – No Animal or Housing Contact
- Level 2 – Animal Housing Contact, No Direct Animal Contact
- Level 3 – Direct Animal or Housing Contact
- Level 4 – Diseased Direct Animal or Housing Contact

Level 1 – No Animal or Housing Contact

To be followed when visits to farms or facilities involve office or home visits only with no contact with animals or their housing area. Examples include visits to a farm office, livestock sales establishment office or general public areas.

- Supplies needed: work clothing and footwear that are free of organic debris.

- Park your vehicle in such a manner to avoid driving your vehicle into or through animal production sites. If you must drive through animal production areas, assure that vehicle tire and wheel wells are appropriately cleaned (free of organic debris) and disinfected prior to leaving the premises. If this cannot be accomplished on the premise, then clean and disinfect at the nearest location (e.g. car wash). Keep vehicle windows closed to reduce insects inside the vehicle.
- Clothes and footwear should be free of organic debris
- If possible, avoid animal areas, pens, barns, etc.
- Assure hands are clean before entering and after leaving the premises.
- Remove as many insect vectors from vehicle as possible.

Level 2 – Animal Housing Contact, No Direct Animal Contact

To be followed when visits involve animal production areas with no direct or minimal contact with the animals. Animal contact should be kept to the minimal level necessary to attain the goal of the visit. Minimal contact constitutes walking through animal housing areas when the animals are not within reach. Examples include livestock sales, kennels, or fair/show visits with no physical contact with animals, animal appraisals and tour of animal production facilities.

- Supplies: Work clothing and footwear those are free of organic debris.
  Clean rubber boots or new disposable (6 mil) boot covers
  Bucket, brush, disinfectant, boot pick or garbage bags

- Wear clean rubber boots or new disposable boot covers upon exiting the vehicle. Disposable boot covers should be worn only when performing limited activities to avoid damaging the plastic and compromising biosecurity.
- After returning to your vehicle, clean and disinfect any reusable equipment that was used, including rubber boots, with a brush and USDA approved disinfectant solution. Dispose of disinfectant solution appropriately and in accordance with label directions.
- If wearing disposable boots, remove and dispose in a manner that prevents exposure to other animals. Place in trash receptacle on the farm (near vehicle), or place in a garbage bag in your vehicle to dispose later.

Level 3 – Direct Animal or Housing Contact

To be followed when there is close or direct contact with animals. Examples include walking through narrowly confined areas where animals are within reach, manure pit inspections or actually handling/inspecting the animals.

- Supplies: Coveralls over clothing – clean cloth or disposable
  Clean rubber boots or new disposable (6 mil) boot covers
  Head covering – disposable bouffant or head gear that can be sanitized after each visit
  Bucket, brush, disinfectant, boot pick
  Garbage bags
  Disposable gloves
  Hand held (garden) sprayer
  Water container (min. 1 gallon)
  Hand sanitizer
  (These items should remain in the vehicle at all times)

- Wear biosecurity clothing upon exiting the vehicle. Disposable boot covers should be worn only when performing limited activities to avoid damaging the plastic and compromising biosecurity.
- Designate "clean" and "dirty" areas or covered tubs in your vehicle to store and dispose of clothing and equipment.
- After returning to your vehicle, clean and disinfect any reusable equipment that was used, including rubber boots, with a brush and USDA approved disinfectant solution. Dispose of disinfectant solution appropriately and in accordance with label directions.
- Remove biosecurity clothing and disposable equipment and place in a plastic bag, then place bag into "dirty" area or tub.
- Use hand sanitizer prior to entering your vehicle.
- Take precautions to ensure inside of vehicle remains clean so that your work clothes, clean coveralls and equipment do not become contaminated. Plastic and removable floor mats should be available for each person to disinfect.
- Vehicle tires and wheel wells should be sprayed with disinfectant prior to leaving the premise or vehicle driven through a car wash.
- At the end of the day, dispose of plastic trash bags that contain dirty supplies in a manner that prevents exposure to other animals. Launder all coveralls and/or clothing. Personal hygiene should include shampooing hair and cleaning under fingernails.

Level 4 – Diseased Direct Animal or Housing Contact

To be followed when confirmed or suspected highly contagious disease exists (Foot & Mouth Disease, avian influenza, etc). Visitors to farms or concentration points must follow this protocol when there is close contact with animals or their housing. More stringent measures may be necessary depending on the specific disease and zoonotic potential.

- Supplies:
  - Disposable coveralls (e.g. Tyvek) – preferably waterproof
  - Clean rubber boots or new disposable (6 mil) boot covers
  - Disposable head covering
  - Dusk mask / Goggles (for general protection – dust, trauma)
  - Particulate/cartridge respirator & Goggles (minimum N95 for zoonotic diseases, requires fit-testing)
  - Duct tape
  - Waterproof (rainsuit) pants & long sleeve jacket
  - Bucket, brush, disinfectant, boot pick
  - Garbage bags
  - Zip lock bags (box of 1 qt. & 1 gallon each)
  - Disposable gloves
  - Hand held (garden) sprayer
  - Water container (min. 1 gallon)
  - Hand sanitizer
  - Sharps container
  - Necessary sampling supplies/equipment

- Level 4 requires additional personal protective clothing. The timing of premises visit should be scheduled (i.e. early morning, night, etc.) to reduce risk of animal disease spread and minimize personal health risk caused by extreme environments factors (heat).
- Vehicles must not be taken onto premises near the animal barns/pens. Vehicles must be parked on a public road right-of-way and personnel must walk onto premises. If the driveway is long, park the vehicle at least ¼ mile from the barns/pens.
- Appropriate disinfectant for disease situation must be used and in accordance with label instructions and dilution.
- A disposable (e.g. Tyvec) suit must be worn with rubber boots or disposable booties, disposable gloves, disposable head covering and dust mask. Duct tape may be necessary to seal gloves and Tyvec sleeve and boots and Tyvec pant leg. A waterproof suit (pants and long sleeve jacket) may also be necessary, depending upon conditions. Use best judgment or seek direction from your supervisor.
- Personal protective equipment should be used if the disease is suspected or determined to be zoonotic (spread from animals to humans). This includes eye protection or respiratory protection [disposable particulate respirator or cartridge respirator, e.g. N95, N99 or N100 (requires fit-tesitng), and close fitting goggles]
  in case of airborne pathogens that could be mechanically spread by mucous membrane contamination. This could be especially important in confinement housing and dusty environments. Use best judgment or seek direction from your supervisor.

- Spare disposable gloves must be taken with you stored in sealed plastic bag (e.g. zip lock bags taped to front of suit) that will be disposed before leaving premises.
- The minimum amount of equipment necessary should be taken onto premises. All equipment taken onto premises must stay on site or be disinfected before leaving the premises. Mobile phones, watches, and other items that are necessary, but cannot be disinfected should be maintained in sealed waterproof bags while on the premises. If photos must be taken for documentation, a disposable waterproof camera is recommended.
- A disinfection point (dirty/clean line) should be set up just outside the premises before entering.
- When leaving the site, all disposable items that have been used (garbage, waterproof bags, disposable suits, etc.) must be placed in a sealed, heavy gauge plastic bag. The sealed bag must be dipped in or thoroughly sprayed with appropriate disinfectant and placed in a second sealed, heavy gauge plastic bag and carried to an identified disposal center.
- When leaving the site, reusable waterproof suits and rubber boots must be thoroughly cleaned and disinfected, paying particular attention to boot treads, pockets and inside pant legs. Exposed area of skin including the face, hands and wrists should be cleaned with soap and water or sanitizer and nails scrubbed. Watches and other items must be disinfected (if not maintained in a waterproof bag). Cleaned and disinfected waterproof suits and rubber boots must be placed in a sealed plastic bag in your vehicle; they may require further cleaning and disinfection.
- Vehicle tires and wheel wells must be cleaned and disinfected prior to leaving the roadside. Prior to visiting another premises or going home, your vehicle must be washed, preferable at an automatic car wash center.
- At the end of the day, dispose of plastic trash bags that contain dirty supplies in a manner that prevents exposure to other animals. Personal hygiene should include shampooing hair and cleaning under fingernails.

Source: GA Department of Agriculture (May, 2005); NC Department of Agriculture & Consumer Services (October, 2005)