Disinfection procedures for personnel and vehicles entering and leaving contaminated premises

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Summary: Entry to and exit from contaminated premises – by animal health personnel, workers, owners, wildlife, insects, domestic animals and rodents – present a risk of disease spread which demands constant attention. The least expensive means of controlling and eliminating the risk of introducing virus and bacteria involves maintaining constant biosecurity programmes. These documented biosecurity measures and procedures must never be compromised by anyone, including the owners of premises.

When time and the monetary investment involved in large and small animal production operations are considered, biosecurity precautions are a small investment cost in keeping the herd or flock free of infectious disease microorganisms.


INTRODUCTION

History and extensive research have shown that disease-causing microbes can be transmitted or introduced to new hosts in a variety of ways. People – with their clothes, shoes, tools and machinery – constitute the most often implicated means of spreading disease from one herd or flock to another. For example, footwear worn by employees in poultry house operations can harbour high concentrations of infectious disease microorganisms: for example, one gram of contaminated chicken manure can contain sufficient microorganisms to infect one million chickens.

Prevention and reduction of the spread of animal disease viruses and bacteria are largely dependent on the following basic principles:

a) good biosecurity
b) decontamination
c) disinfection
d) sanitation.

Continuous surveillance programmes ensure early disease detection for the rapid elimination of fast-spreading microbes. However, general biosecurity procedures

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necessary for entering and leaving contaminated premises should be used by owners, veterinarians, herd/flock managers and service personnel. Effective biosecurity measures, together with practical management procedures in animal husbandry, also contribute to the production of safe and economical products.

**SUGGESTED EMERGENCY ACTIONS FOLLOWING A DISEASE OUTBREAK**

It is absolutely essential that an effective plan is prepared and implemented to ensure safe entry to and exit from premises suspected of being contaminated with animal disease. The plan must include documentation of customized cleaning and disinfection procedures for all personnel who enter and leave contaminated premises. The emergency procedures should supplement routine biosecurity activities, to prevent the spread of disease organisms to other premises.

Pre-packaged supply kits for veterinary personnel (e.g. diagnosticians, epidemiologists, euthanasia crews, disposal crews and disinfection personnel) should include all the necessary items to ensure safe entry to and exit from the contaminated premises. These pre-packaged supply kits should include as many disposable items as possible. Small disposable items are less expensive and do not have to be decontaminated if properly maintained or disposed of (e.g. by burial or incineration).

The equipment, materials and supplies listed in the Appendix are suggested for veterinarians and others making diagnostic investigations of premises known to be or suspected of being contaminated.

**SUGGESTIONS FOR THE PERSONAL BIOSECURITY OF ANIMAL HEALTH PERSONNEL ENTERING AND LEAVING RESTRICTED FARMS OR CONTAMINATED PREMISES**

The following biosecurity measures could be adopted by animal health personnel in the vicinity of premises where a disease outbreak has occurred or is suspected:

- Do not drive onto the contaminated farm or quarantined premises. Park the vehicle at least 100 m from the animal area or outside the entrance to the contaminated premises. Keep vehicle windows closed to prevent insects from entering (10). A supply of sealable plastic bags should be kept in the vehicle; these may be used to store equipment, etc., on returning to the vehicle from the contaminated premises.
- It is suggested that all personnel entering contaminated and non-contaminated premises consider the passenger compartment of the vehicle as 'clean' and the cargo area (back of pickup, or trunk [boot] of car) as 'contaminated'.
- Before entering the property, change into biosecurity clothing. This includes freshly-laundered fabric coveralls or disposable coveralls. Use only rubber boots which have been cleaned, washed and properly disinfected. Use headgear covers and disinfected hardhats, as necessary. Wear short-sleeved undershirts (or roll sleeves above elbows) before putting on protective coveralls. If weather conditions permit, only undergarments (e.g. exercise shorts and undershirts) should be worn beneath coveralls.
- Do not bring lunch coolers and boxes, or drinks and other consumable items onto the contaminated premises. If food and liquids must be carried onto the premises, use disposable water containers, cups and other items. Properly dispose of all containers before leaving the premises.

- Before returning to the vehicle, all collected laboratory specimens must be placed in small plastic bags and sealed. All equipment, diagnostic kits, laboratory specimens and other items must be placed in sealed plastic bags and immersed in disinfectant solution (10). Cameras and other items used during post-mortem examinations must be cleaned, washed and disinfected prior to leaving the necropsy area (10). Cleanse all instruments in the disinfectant solution and seal these in plastic bags. Clean, wash and disinfect protective boots before leaving the necropsy area. Keep surgical gloves on at this time. Clean and wash the outer surface and handle of the disinfectant bucket.

- Animal carcasses from which laboratory specimens have been collected must be disposed of in an approved manner (e.g. by burial, incineration or composting), preferably on the contaminated premises. Caution should be exercised if composting is selected, as wildlife and other animals have been known to spread disease by consuming infected tissues (9).

- Return to the vehicle with all equipment and other items which were brought onto the premises. Leave behind only disposable items which can be safely disposed of by the owner of the premises.

- Do not unbutton/unzip or remove protective clothing and boots until all items of equipment have been safely stowed in the vehicle.

- **Do not enter the vehicle until all biosecurity garments have been removed.**

- After returning to the vehicle, remove surgical gloves and wash bare hands in disinfectant. Immerse plastic bags containing laboratory specimens in disinfectant solution for a second time, and then place these in another plastic bag for transportation to the laboratory. Place laboratory specimens in the 'clean' area of the vehicle. All other items should be placed in the 'dirty' area of the vehicle for disposal later (10).

- Plastic bags containing contaminated items should be thoroughly sprayed or wetted with a disinfectant before being placed inside a second plastic bag (which has been safely stored in the vehicle during the visit to the contaminated premises).

- If the use of items such as cameras, generators, centrifuges and other equipment is necessary on the contaminated premises, these items must be cleaned, washed and disinfected prior to removal from the premises or placed in double-sealed plastic bags for safe transport to other locations and biologically safe disinfection (10).

- Spray aerosol pesticide in the vehicle to kill any insects which may have entered the vehicle. Leave the insecticide to work for a few minutes. Spray vehicle tyres and the underside of fender wells with disinfectant (7). When equipment, laboratory specimens and disposable items have been placed in the 'dirty' area of the vehicle, spray the ground/surface area around the vehicle trunk and/or vehicle door area. Spray shoes with disinfectant before entering the 'clean' area of the vehicle. Place hand-held sprayer, buckets and brushes in the 'dirty' area of the vehicle.

- Before entering the 'clean' area of the vehicle, wash face (including nostrils and ears), hands, forearms and other exposed areas of the body at least twice, using an effective antiseptic soap and water. Antiseptic soaps have been shown to reduce microorganisms on the skin when used with water during pre-disinfection washing.
Safety goggles, spectacles and earplugs should be cleaned, washed and wiped with a cloth moistened in disinfectant (1).

- **Do not pour unused disinfectant solution on the ground or leave disinfectant containers on the premises. Always dispose of all unused disinfectant and containers in an approved manner.**

- All personnel leaving contaminated premises should bathe or shower immediately on returning to their residence. Hair, beards and fingernails should be thoroughly cleaned, washed and rinsed. The use of an effective antiseptic soap is recommended for bathing or showering (3). All underclothing worn during the visit to the contaminated premises should be laundered using a detergent or antiseptic soap.

- Laundering recommendations for protective clothing and undergarments contaminated with disease or disinfectants must be carefully observed. Rubber boots and gloves should also be cleaned – inside and out – with soap and water, and rinsed thoroughly each day (or more often if contamination has occurred or is suspected). Rubber or plastic protective trousers, coats and headgear should also be washed, rinsed and dried in sunlight. Contaminated clothing should be washed separately from other items. If the washing of contaminated clothing is entrusted to a commercial laundry, the laundry owner and employees should be advised to exercise particular caution. Pre-rinsing and pre-soaking of contaminated protective clothing will help in removing disinfectant and other materials. Laundry detergents containing phosphate or carbonate, and heavy-duty liquid cleaning soaps, are effective in removing disinfectant residues and other materials from fabric coveralls and other items of clothing (6). Caution should be exercised when using bleaches or ammoniac laundry additives, as mixing these two types of additives has been known to produce toxic gases. After washing protective clothing, line-drying outdoors in sunlight – or drying in mechanical driers set on the hottest setting – is recommended. Many disease microorganisms, pesticides and disinfectants are inactivated when exposed to direct sunlight.

- Personal clothing (including undergarments) should be changed completely before making inspections on other premises, whether or not these are contaminated.

- The complete epidemiology of certain foreign and domestic animal diseases is not completely understood. Therefore, in the interest of safety, common sense and considerable caution should be exercised in establishing time limits between visits to contaminated premises by animal health and other personnel (9).

### BIOSECURITY INVOLVING EQUIPMENT AND CONTROL OF MOVEMENTS ON AND OFF CONTAMINATED PREMISES

Control of all movements (e.g. of equipment and personnel) must be given immediate priority in the event of a disease outbreak. This also applies to the movements of feral animals. For example, feral cats, wild skunks, rats, mice and other wildlife have all been found to carry *Salmonella enteritidis* phage type 4 in their intestines (8). In addition, domestic cats and dogs should be prevented from entering premises where large concentrations of animals are maintained.

Signs should be posted in and around all animal buildings and facilities, prohibiting entry to the premises by all vehicles and personnel unless special permits have been issued. A record should be kept of all visitors to the premises, including the dates of
visits, the names of visitors, and the purpose of the visit. Business and home addresses and telephone numbers of all visitors should be recorded for future epidemiological review, as necessary.

Delivery personnel, inspectors, meter readers, etc., should all be considered a potential threat to the health of the herd or flock.

Even visitors who claim to have made no previous visits to other animal-rearing facilities (large or small) should be required to wear boots, coveralls and caps when visiting or inspecting contaminated buildings and facilities. It is suggested that both large and small operations furnish all protective clothing and boots to visitors; this will ensure that all individuals leaving the premises may be obliged to take a shower and subsequently replace street clothes and shoes. All boots and protective wear must be cleaned, washed and sanitized before being used by subsequent visitors (1).

The following biosecurity suggestions are made to enable owners, veterinarians and herd or flock managers to supplement general on/off premises biosecurity procedures. These suggested procedures will apply to premises where disease contamination has been confirmed or is suspected:

- During a disease outbreak, all personnel and vehicles entering or leaving the contaminated premises should be considered potential carriers of disease organisms.

- Each vehicle operator should be issued with the following equipment:
  - disposable or washable fabric coveralls
  - rubber boots
  - disinfectant
  - bucket and brush
  - aerosol insecticide (for the interior of vehicles)
  - heavy-duty plastic bags for dirty boots and coveralls
  - washable or disposable surgical headgear
  - paper towels.

- A vehicle operator and vehicle should be allowed to visit only one set of premises per delivery or pickup. The vehicle should carry sufficient feed, supplies, equipment, fuel and other items for only one delivery per trip.

- On completion of a delivery or pickup, the vehicle should be required to return to the storage point for complete cleaning (inside and outside) and disinfection (2).

- Vehicle drivers should operate only sanitized vehicles and should wear clean boots, washable or disposable surgical headgear, and fabric or disposable coveralls or rubber rainsuits. Protective clothing should be put on only at the terminal base immediately prior to delivery or pickup.

- Pickup and delivery drivers must not be allowed to enter animal production buildings while making deliveries or picking up items from contaminated premises. Drivers should not be allowed to make intermediate stops between the contaminated premises and the terminal base.

- Flies and other insects should not be allowed to enter the vehicle at any time. Any insects or flies within the vehicle should be exterminated by using an approved aerosol insecticide before the driver re-enters the vehicle (5).

- The route taken by vehicles entering or leaving the contaminated premises should minimize the chance of contamination of the vehicle by dust or manure. The chosen
route should avoid the vicinity of manure piles, dead animal compost areas, or inlets for cooling or air intake systems of animal buildings, to reduce the possibility of cross-contamination.

- Contract service personnel required to enter areas containing infected animals must always wear appropriate sanitized protective clothing and footwear (2). Requirements for personnel to take showers before and after visits to these areas must be strictly enforced, to reduce the possibility of disease spread within and beyond the premises.

- When laboratory diagnosis has confirmed the presence of infectious disease, and animal containment orders and quarantine measures have been implemented, immediate steps must be taken to supplement and increase biosecurity within and around the contaminated premises. A cleaning, washing, disinfection and inspection station must be established at the entrance to the contaminated premises. Personnel trained in cleaning, washing, disinfection and inspection must be assigned to the station at all times until the premises have been declared decontaminated. The following equipment and materials must be available at the inspection station:
  - motorized pressure washer (> 700 psi [≥ 48 × 10^5 Pa])
  - water source (e.g. portable tanks)
  - hand-held sprayers
  - portable sanitary facilities (toilets)
  - approved disinfectant
  - approved aerosol spray for passenger areas in vehicles
  - protective clothing
  - cleaning equipment (e.g. brushes, shovels, scrapers)
  - heavy-duty plastic bags (large and small)
  - items to contain run-off from the washing area (e.g. straw bales, gravel, sand)
  - water heating source (necessary during cold weather)
  - anti-freeze coolant (for use with spraying equipment during cold weather)
  - electrical power generators.

Managers of cleaning, washing, disinfection and sanitation operations should require all vehicle operators leaving or entering premises which are known to be contaminated, to pressure-wash the underside of fender wells and vehicle frames. This will ensure that all dirt, manure and other material is completely removed prior to applying the approved disinfectant with hand-held sprayers or low-pressure motorized sprayers. Dirt, manure and other material should be brushed or scraped from inside the vehicle and the interior washed with detergent. The interior (steering wheel, floor mats, control pedals and door jambs) should be wiped down with an approved disinfectant solution. All visible insects should be removed and the interior sprayed with an approved aerosol pesticide. All exposed or contaminated items should be collected at the entrance inspection station in an approved manner.

Vehicle wheel baths do not constitute an effective disinfection method for vehicles entering and leaving contaminated premises (4). Infectious disease organisms can be introduced to or removed from contaminated premises on vehicle tyres and underneath vehicle frames. Driving slowly through a wheel bath will not remove caked soil and manure, and the removal of these deposits by high-pressure water is therefore mandatory prior to disinfectant application.
Wheel bath applications are very expensive to maintain, and should be used only on non-contaminated premises, in conjunction with normal biosecurity programmes.

**CONCLUSION**

When bacteria or viruses infect animals, infectious organisms quickly begin to multiply at phenomenal rates. Some pathogens often survive in protected locations on contaminated premises for much longer than expected. Biosecurity measures — including regular washing, cleaning, disinfection and sanitation programmes — help in reducing and eliminating disease-causing organisms. Effective biosecurity measures, together with other practical management applications in animal production, ultimately contribute to the production of a safer and less expensive food product.
bioseguridad permanentes. Estas medidas y procedimientos de bioseguridad, basados en documentación fiable, no deben ser soslayados por nadie, ni siquiera por los propietarios.

En comparación con el total de tiempo y dinero invertido por una empresa de producción animal, sea ésta grande o pequeña, el costo que implica el respeto de las reglas de bioseguridad para proteger los hatos o los rebaños de los microbios patógenos es relativamente modesto.


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Appendix

**List of equipment, materials and supplies for veterinarians and others making diagnostic investigations of premises known to be or suspected of being contaminated**

This list is not intended to be exhaustive and may be changed as necessary to meet specific needs.

**Items for cleaning and disinfection**
- Plastic bucket and brush
- Towels (paper and fabric)
- Water container (2 US gallon [8 l] capacity)
- Antiseptic soap
- Footbath pan (18-20 in. [45-50 cm] diameter)
- Plastic washing bowl
- Plastic refuse bags (heavy-duty, 150 l capacity)
- Disinfectant (3)

**Protective wear**
- Surgical rubber gloves
- Safety goggles
- Boot covers (plastic and surgical)
- Coveralls (fabric or disposable)
- Surgical masks
- Surgical head covers
- Rubber boots (not overshoes)

**Diagnostic supplies**
- Diagnostic kit in plastic case
- Disposable syringes (3 ml)
- Disposable needles (1 in. length, 20 gauge)
- Sterile broth medium
- Sterile cotton swabs (18 cm and 9 cm length)
- Plastic sealable bags (16 x 16 cm and 24 x 24 cm)
- Sponge and wiping cloths
Miscellaneous items
- Forms for reporting collected laboratory specimens
- Containers for laboratory specimens
- Masking tape
- Metal clipboard
- Waterproof adhesive tape
- Waterproof ink-pens
- Coolant material
- Aerosol insecticide
- Flashlight (simple to clean and disinfect)
- Packing material (cotton wadding).

REFERENCES


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