

Appendix 9. Protocol for Maintaining Two Flocks of Different Health Status - Generic Recommendations

For producers that wish to keep animals of unknown or lower disease status on the same premises as animals of higher health status, there are strict requirements to follow to ensure that disease is not transmitted to the higher status flock. These protocols are generic, i.e. aren't specific to one contagious disease .

Buildings

- a. Separate buildings housing different status animals by *at least 5 metres* from other livestock buildings.
- b. One exception to this is if the buildings have no internal access to each other and ventilation can only flow from the higher status flock to the lower.

Leaving and Returning to the Higher Status Flock

- a. Sheep leaving the higher status flock for any reason cannot return to the higher status flock without a period of isolation (NB, this includes rams).
- b. This period of isolation and the required testing protocol will vary with the disease under consideration.
- c. Please note that the required biosecurity precautions for a specific disease certification program, ALWAYS supercede these recommendations.

Pastures

- a. Sheep of differing health status should not graze the same pastures during the same grazing season. This period of time may be longer depending on the disease in question.
- b. Fences should be constructed so that there is no opportunity for physical contact between the two flocks (e.g. escapes, shared water source, mineral and salt supplements) and no opportunity for manure run-off from the lower status flock to the higher.
- c. If the only water source is a stream or river, the higher status sheep should have access up-stream from the lower status sheep. Ponds or lakes should not be shared if there is any concern regarding Johne's disease (ovine paratuberculosis).
- d. If there is concern of preventing Johne's exposure,
 - i. Pastures should be empty of lower status sheep and of cattle for at least one grazing season which includes two full winter seasons, before being used by higher status sheep.
 - ii. Plowing and reseedling of the empty pasture is also required to reduce bacterial pathogen load.
 - iii. Manure should not be spread on these pastures unless composted for at least 2 years.
 - iv. In cases of known high prevalence of Johne's disease in the lower status flocks, it is strongly advised that this period be increased to a minimum of two years.

Protective Clothing

- a. Separate boots and coveralls should be worn whenever working with the higher status flock.
- b. These do not leave the higher status barn except for laundering.
- c. They can be worn over clean "street" clothes but not over protective clothing worn to handle lower status sheep.
- d. Hands and arms should be washed with iodine or chlorhexadine soap before entering clean facilities.
- e. Hats, overcoats, mittens and gloves should also be changed or not worn into higher status facilities.

Entry Biosecurity

- a. The main laneway to the buildings housing the higher status sheep should be gated with a locking device.
- b. This gate, which may be in the form of a gate or chain barrier, should be clearly signed, indicating no admittance without permission of the farm manager.
- c. Visitors from off-farm that need to visit the flock (e.g. shearer, veterinarian, purchaser), should wear clean coveralls and boots that have not been exposed to lower status sheep. Rubber boots must be thoroughly washed prior to entry with a disinfectant soap. Leather boots should be worn inside clean rubber boots or plastic disposable boots. Coveralls should be freshly laundered. All visitors should first visit the higher status flock, following the protocol above, before visiting the lower status flock.

Vehicles and Large Equipment

- a. Trucks, tractors, manure removal equipment, feeding and watering equipment should not be shared between flocks. If large pieces of equipment must be shared, they should be thoroughly washed and disinfected before coming into the higher status flock.
- b. Vehicles from off-farm should not enter the yard to which sheep may have access, unless first cleaned of manure. Vehicles of particular risk are commercial livestock trucks or trailers. If shipping lambs to market regularly and using a commercial livestock carrier, it is advisable to build a loading ramp away from any areas where sheep may be housed.

Other Equipment

- a. Separate equipment for shearing (blades, shearing unit, board, clothing and footwear), taildocking, castrating (ringing equipment), drenching, automatic syringes, lamb tubes & artificial rearing equipment, warming boxes, crates, restraint equipment and any equipment that is used in direct contact with sheep is strongly recommended. In the face of economic hardship that precludes having two of everything above, disinfection must be used⁵.

Manure Management

- a. Fresh manure from the lower status flock must not be spread on pastures or hay fields unless the hay is being sold off-farm or is to be fed to other species of livestock (e.g. horses).
- b. Manure run-off must be contained so that it cannot reach yards, fields or contaminate water sources.
- c. Composting manure is an acceptable way to "rehabilitate" manure. However, the manure should be a minimum of two years of age and turned at least once to ensure total composting. A composting manure pile should not have fresh manure added to it.

Dead Stock

- a. Dead carcasses must be buried or composted promptly away from contact with either flock.
- b. Carrion eaters (dogs, coyotes, foxes, crows, seagulls, hawks and eagles) must be prevented from gaining access to these carcasses as they can spread disease.

Predator Livestock

- a. Use of guard dogs, llamas and donkeys are acceptable ways of protecting livestock from predators. Dogs often travel from flock to flock within a farm and this is acceptable. Donkeys do not share diseases with sheep and can be moved from flock to flock although if foot rot is present in either flock, disinfection the donkey's feet prior to moving with zinc sulphate is recommended.
- b. Llamas can be infected with some sheep diseases, notably Johne's disease and caseous lymphadenitis. Tests have not been developed to ensure that this species is free of disease. For this reason it is recommended that llamas that come from sheep farms of unknown or lower health status not be used for predator protection in the higher status flocks.

Insect and Vermin Control

- a. Flies can spread disease. Control flies through prompt removal of manure from yards, using fly traps and fumigating if necessary.
- b. Rodent (rats, mice) and bird control (pigeons, crows, sparrows, swallows, seagulls) should be practised as they can spread disease. This can be done by using rat poison down rodent holes (dicoumarol), fumigating or trapping.

⁵ Disinfection of equipment can be done with sodium hypochlorite (6% bleach) by mixing 1 part bleach to 2 parts water for a final solution of 2% sodium hypochlorite OR sodium hydroxide by mixing 80 grams of sodium hydroxide crystals with 1 litre of water to make a 2 molar solution. These agents are effective against most viruses, bacteria and the Scrapie agent. Both can be used for disinfection of surgical equipment, docking and tattoo equipment, multi-dose syringes and work surfaces. Minimum contact time should be 10 seconds with the product being rinsed or wiped off after disinfecting. Chlorhexadine solution or soap is effective for disinfecting shearing blades. It is effective against the causative agent of caseous lymphadenitis. Formaldehyde gas is very effective for disinfecting buildings but toxic if inhaled. QUATS and Phenols can be used for generalized cleaning but have some limitations in efficacy. Follow the guidelines in this document for general disinfection.

- c. Screen windows and ledges that can be used for bird nests. Plug holes.

Shearing CLA Negative Flocks

- a. For closed flocks, the shearer represents a significant risk for the introduction of caseous lymphadenitis. The onus is on the flock owner, with the cooperation of the shearer, to ensure that the disease does not have an opportunity to enter the flock at shearing time.
- b. The bacteria (*Corynebacterium pseudotuberculosis*) can survive for weeks and months in dried pus on shearing equipment and can invade slightly abraded and unbroken skin.
- c. For this reason, it is recommended that
 - i. The higher status flock have its own shearing equipment, shearing board, moccasins, table for tagging and folding fleeces. These equipment are very difficult to disinfect in an effective manner so, if shared, pose a significant risk to the flock.
 - ii. Coveralls or shearing pants as well as shirts, coats and hats used by the shearer and any assistants should be freshly laundered and not used in any other flock.
 - iii. Boots used by assistants should be freshly scrubbed and disinfected.
 - iv. Wool bags should either be new, freshly laundered or left outside the yard.
 - v. Before shearing, the shearer should wash his/her arms and hands with chlorhexidine soap.
 - vi. All nicks and abrasions post-shearing should be treated immediately with 2% iodine solution.

General Guidelines for Disinfection:

Disinfection = process of eliminating infectious organisms by using chemical or physical agents. What follows is a brief overview of disinfection and disinfectant agents. For a more complete overview, please consult the publication: Disinfectants: actions and applications. Scientific and Technical Review, Office internationale Epizootic, Vols 14 (1) & 14 (2), 1995

Disinfection of a Premise

- Remove all animals, utensils & equipment (e.g. feeders and waterers) - scrub and clean utensils and equipment with detergent soap. Rinse well.
- Make sure electrical outlets are covered. Wear protective clothing (boots, rubber gloves, coveralls, mask).
- If waterers are not removable, empty completely and clean as above. Make sure they are rinsed well after disinfecting.
- Make sure run-off isn't available to livestock or contaminates water sources.
- Gently wet area to prevent dust (e.g. *Coxiella burnetii* is highly infective when inhaled in dust), knock down cobwebs after wetting.
- Scrub, scrape and flush away all gross organic material using a cleaner/sanitizer detergent compound (e.g. 2-4% sodium carbonate).
- Rinse well. High pressure hot water will help to dissolve fats and other organic debris when cleaning and rinsing. The premises must be rinsed well to prevent inactivation of disinfectant. They must also be dry before applying disinfectant.
- Apply disinfectant and leave on for recommended time as outlined in the directions.
- Dirt yards that cannot be disinfected, should have organic debris scraped away and wet areas drained or built up. Fences around yards and outdoor equipment should be scrubbed and disinfected as above.
- Lamb milk feeding equipment - wash with detergent, rinse well and rinse with 2% hypochlorite solution (bleach).

Footbaths

- Locate at every doorway with a boot brush hanging nearby
- Boots should be scrubbed and washed every time an individual enters and exits the premises
- Change every 3 days or more frequently if become contaminated with organic material
- do not add salt or antifreeze to prevent freezing.
- should be a minimum of 10 centimetres in depth

Selecting a Disinfectant

Disinfectants will not work well unless organic material is removed, the detergent flushed well and the premises dry. After that, the main considerations are environmental hazard, the agent to be killed and availability. A short description on the uses of common disinfectants:

Phenols: These are commonly found in household disinfectants (e.g. Lysol) and often have a pungent smell (even after no longer effective as a disinfectant!). They are effective against a broad range of bacteria, particularly gram positive bacteria but not against bacterial spores (e.g. Clostridial diseases, Anthrax). Effective against enveloped viruses. They are also corrosive and irritating to skin.

Quaternary Ammonium Compounds (QUATS): They have a broad spectrum of activity (gram + and gram - bacteria and enveloped viruses. Not effective against *Mycobacterium* sp. (e.g. Johne's disease), bacterial spores, fungi and non-enveloped viruses. They are useful in general disinfecting and cleaning, even in the presence of trace organic debris. They are often the disinfectant of choice since they are effective and non-toxic. Some individuals may develop contact dermatitis with repeated exposure.

Alcohols: This is usually ethyl alcohol or isopropyl alcohol. They are effective against a wide range of organisms but not bacterial spores or some non-enveloped viruses. The concentration must be high to be effective (60-90%). Repeated use on rubber equipment can cause damage, they are irritating to the skin with prolonged use and are expensive to use for cleaning of large surfaces.

Hypochlorites (Chlorine): e.g. Bleach is sodium hypochlorite. Very effective against many bacteria, viruses and prions (e.g. scrapie) but inactivated in the presence of organic material and not effective against bacterial spores. Ammonia (animal urine) will also inactivate. Sodium and calcium hypochlorites are effective but corrosive. Useful for disinfecting metal equipment. 1 part 6% bleach to 2 parts water makes an effective solution of 2% bleach. If using for equipment that may be contaminated with prions, use at a 5% solution.

Iodine and Iodine Based Disinfectants: Aqueous (Lugol's) and alcoholic iodine (tincture) are often used as antiseptics on wounds. Iodophors (iodine + carrier) release iodine in an acid medium and are effective in the presence of trace organic material against bacteria and viruses. They can be used as skin disinfectants or for general disinfection and cleaning.

Hydrogen Peroxide (30%): A stabilized peroxide makes an excellent disinfectant for surfaces and works against almost all pathogens including enveloped and non-enveloped viruses, bacteria, fungi and some activity against bacterial spores. These products may be blended with QUATS, peracetic acid and iodophors.

Chlorhexadine: Used as skin cleaners in low concentrations (<4%). It is useful against gram positive bacteria (e.g. *Corynebacterium pseudotuberculosis*) but less so against coliforms and viruses. It can be used for cold sterilization of surgical instruments and shears if they are rinsed clean first. It does not work well in presence of organic material.

Gluteraldehyde: Are bacteriocidal, virucidal, fungicidal and parasiticidal and work well in the presence of organic material. But they need to be used in a well-ventilated area and are dangerous to work with.

Formaldehyde: Formaldehyde is a gas but is available as a 37% solution known as formalin. Formaldehyde is often used to fumigate buildings (swine, poultry, veal) by pouring formalin onto potassium permanganate. This is rarely used in sheep premises because of the danger. 1 to 5% formalin is sometimes used as a disinfectant but is very irritating and toxic and may be carcinogenic to workers.

Peracetic Acid: Is a very strong oxidizing agent and effective against many pathogens including bacterial spores. It is mildly corrosive and should be used with care but doesn't harm the environment.

Sodium Hydroxide: lye or caustic soda (NaOH) is effective at 2% but caustic to handle. 80 gms of crystal to 1 L of water makes a 2 molar solution which is good for disinfecting equipment if Scrapie is a concern. Allow 10 minute contact time and then rinse.

For cold sterilization, gluteraldehydes, phenols and 70% alcohol (with antirust tablets) can be used. Check with your veterinarian to determine what they use. However, to be effective, the instrument should first be cleaned of organic material and fats and then left in the solution a minimum of 5 minutes. The solution should be changed frequently. Shearing blades, scalpels, and other surgical instruments would come under this.

Examples of some common commercial disinfectants:

Trade Name	Active Ingredients	Activity
Oo-cide (Vetoquinol)	Ammonium chloride + sodium hydroxide	When combined, destroys coccidial oocysts. For use after animals and litter removed.
Hibitaine (Wyeth)	chlorhexadine (2%)	To clean surfaces and kills viruses
Virkon (Vetoquinol)	potassium monosulfate	Non-corrosive virucidal, fungicidal and bacteriocidal disinfectant. Replaces formaldehyde fumigation
Metricide (Metrex)	glutaraldehyde (2.6%)	Useful to disinfect and sterilize surgical equipment
Premise Disinfectant (Westagro)	iodine (1.7%)	Useful for a boot disinfectant as well as surface once organic material has been removed.
Beaucoup (Ecolab Health Care)	phenols	Useful as a surface disinfectant
Peroxigard (Ecolab Health Care)	hydrogen peroxide (7%)	Useful for disinfecting walkways and floor surfaces after cleaning

1. Disinfectants: actions and applications. Rev. Sci. Tech. Off. Int. Epiz. 14: 9 - 472.
2. Anderson NG. Health protection and sanitation strategies for cattle. OMAFRA FactSheet 90-202. 1990.