

Biosecurity / Biopromiscuity and Keeping the Flock Healthy

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What is Biosecurity ?

Biosecurity is an integral part of all procedures we use as veterinarians and producers to promote animal health and protection. Biosecurity involves all measures and policies taken to protect from biological harm, including those undertaken to prevent introduction of disease agents into a specific area (e.g. a farm or region or country) and those that limit the spread or effect of disease agents present in a specific area or group of animals (also known as biocontainment). All measures that promote host immunity or reduce risks from the disease agent or reduce or eliminate environmental factors that increase risk of disease are components of biosecurity.

Most biosecurity measures are applied to the farm or property where the animals reside, but there can be more than one area within a farm (e.g. flocks with different health status), or several properties may be considered to be one unit, e.g. young-stock on one property and breeding animals on another.

Biosecurity utilizes the principles used in the three pillars of health management:

Disease Control- i.e. reducing the level of disease to a level where it is not an economic or welfare concern;

Disease Eradication – i.e. when a disease agent or the factors necessary for its development are eliminated from a geographic area or population; and

Disease Prevention – i.e. when the disease agent or necessary factors are prevented from entering a geographic area or population.

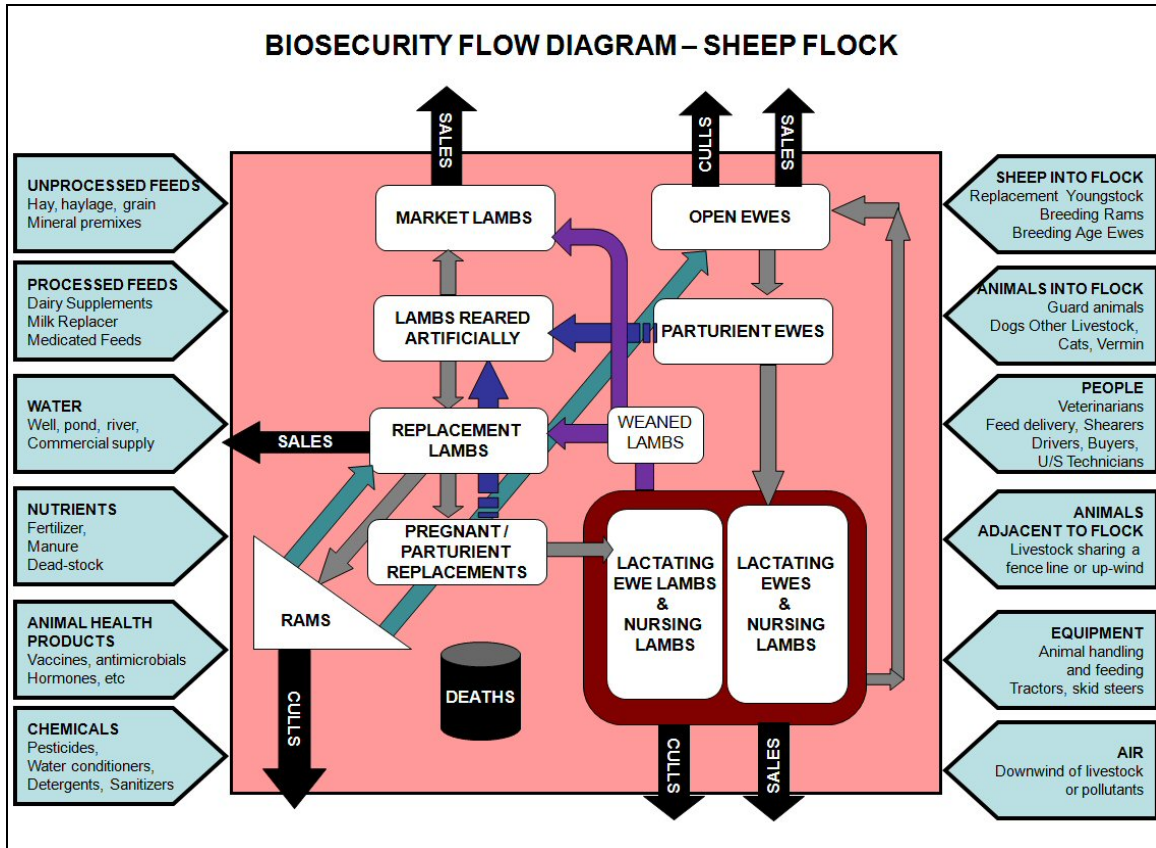
Tools and Protocols Used in Biosecurity

There are many tools that can be used to practice biosecurity. For the best results, the use of these tools requires written protocols and possibly training to make sure the producer / employee carries them out correctly. These tools are commonly used to control, eradicate or prevent disease:

- Isolation of new arrivals into a farm or region or nation
- Isolation of sick animals within a farm or region
- Testing for disease prior to introduction to a farm or region
- Prophylactic treatment for disease prior to introduction of animals
- Vaccination
- Test and remove for a specific disease within a herd
- Monitoring for disease, e.g. necropsy of on-farm deaths, diagnostic testing of diseased animals
- Prophylactic / metaphylactic treatment of a group of animals at risk of illness
- Restrictions on animal movement within a property
- Control of animal flow so that naïve healthy animals do not contact high risk animals
- Disinfection or other measures to reduce or eliminate infectivity of housing, equipment or feed used in the management of animals
- Restrictions of people movement or flow on a property
- Protective clothing that can be changed to keep risk of disease transmission low
- Restriction of entry of people, vehicles or equipment from outside

To understand how biosecurity can be applied to a sheep farm, it is a good idea to detail the flow of inputs and outputs. Biosecurity Flow Diagram – Sheep Flock shows the inputs as well as the flow of a

typical meat sheep flock.



Reducing Risk from Introduction of New Genetics:

These could be breeding age rams (experienced) or ram lambs (virgin), replacement ewe lambs (bred or open), pregnant, nursing or open ewes. The most common way of introducing a disease to a flock is the purchase of an animal that is already infected with the disease. This can happen in one of three ways: the sheep is incubating disease – appears healthy at the time of introduction and comes down with the disease at some point after purchase; the sheep is recovering from disease – but is shedding the disease agent; and the third way is if the sheep is a persistently infected carrier of the disease agent and is able to shed it in some way. Few people will purchase an animal that is obviously ill, but it is important to educate producers on the risk of buying animals of unknown health status.

Examples of Diseases That May Enter the Flock from Purchased / Borrowed Sheep That Appear Healthy:

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|---------------------|--|
| Lacrimal secretions | Pink eye |
| Saliva | Border Disease virus, Foot and Mouth Disease, Rabies |
| Respiratory Tract | Respiratory viruses, maedi visna virus, caseous lymphadenitis, enzootic nasal carcinoma |
| Integument | Chorioptic mange, sucking and biting lice, sheep keds, ringworm, caseous lymphadenitis, contagious ecthyma virus (orf) |
| Feet | <i>Dichelobacter nodosus</i> which causes footrot |
| Udder (milk) | MV-v, <i>Staphylococcus aureus</i> , Johnes disease, <i>Coxiella burnetii</i> |
| Feces | Gastrointestinal / lung parasites + anthelmintic resistance, lungworm, |

	cryptosporidia, coccidia, Salmonella, Johnes Disease, <i>Campylobacter</i> abortion, <i>Coxiella burnetii</i>
Urine	Leptospirosis, Border Disease virus
Reproductive tract	<i>Chlamydophila</i> abortion, toxoplasmosis, coxiellosis (Q-fever), <i>Brucella ovis</i> , scrapie

Goats and in some cases llamas and alpacas, share many of these diseases. It is prudent to consider them all as part of the sheep flock – if present.

The risk associated with the source of animals can be evaluated. The following is a suggested ranking of risk – with low risk at the top and increasing risk down the list.

- Washed embryos / semen from approved facility
- Fresh semen
- Sourced only from flocks of known and low-risk health status
- Single source – unknown health status
 - Virgin ram lambs and ewe lambs
 - Mature rams and ewes
- Borrowing or lending sheep (rams, 4H lambs)
- Multi source / source not closed / or unknown health status of source flock(s)
- Sales barns or assembled flocks with no health records

Using AI and Embryo Transfer Exclusively:

Semen collected at an accredited AI centre from health tested rams, is a very low risk way to introduce genetics. AI is most often performed by laparoscopic in utero insemination. Fresh semen from untested rams is higher risk for some diseases. Embryos are still considered a risk for scrapie but washed embryos if collected according to the regulations of the International Embryo Transfer Association, are lower risk for most diseases.

Purchasing Sheep from Flocks of Known Low Risk Disease Status:

It is very difficult to declare a flock “free” of any specific infectious disease, but through testing and monitoring, it may be possible to declare the flock low risk, based on scientific testing and biosecurity.

Purchasing Sheep from a Single Source:

Other ways of reducing the risk of introducing disease is to limit the number of flocks from which animals are purchased. Some flocks are closed and have reasonable health status even if not on a disease status program. Others practice “biopromiscuity” but may have a good name in the industry (e.g. genetics, show performance). Virgin rams and maiden ewe lambs may have a better health status than rams already used in the flock or than ewes that are pregnant. If replacement sheep are sourced only from closed flocks, then the rams have a known health status. Purchasers of rams can put pressure on seed-stock flocks to enrol in health programs so that the risk that the commercial producers will purchase disease is lowered. However, commercial producers must be willing to pay for superior health status to make sure that it is worth the investment by the seed-stock producer.

Borrowing or Lending Sheep

Some smaller producers may lend (or borrow) rams to add genetic diversity to their flocks. 4H programs are popular with children obtaining lambs from neighbours or dealers to raise and show. Without health matching (farms sharing same health status and biosecurity plans), this practice can lead to health disasters.

Reducing Risk from New Entrants

Quarantine of New Additions

For some diseases, moving a purchased or reclaimed animal back to the farm can be done by first quarantining the animal. The animal should be truly isolated, i.e. housed well away from the main farm, ideally on another property – or at least in housing not used by home sheep. The person caring for the sheep would wear separate coveralls and boots and must practice good hygiene. While in quarantine, the animal can be tested for disease or treated prophylactically – depending on the disease in question. Unfortunately many of the diseases that we are concerned about, can still be present undetected in the animal – even at the end of a long quarantine period.

Screening New Entries:

If the health status of the source flock is unknown, then for some diseases the animals can be screened prior to entry. The screening process will be different for different diseases and some processes are very accurate and others are not. E.g.

- Maedi visna – 2 negative serological tests 8 to 12 weeks apart while the sheep is in isolation – separated from all other animals. This animal will be low risk for introduction of MV. Sheep should be 6 months of age to assure test results reflect infection rather than passive transfer of colostrum.
- Caseous Lymphadenitis (CLA) – palpation of external lymph nodes and a negative serological status. Vaccination may reduce risk although most are only useful if the animals are vaccinated prior to becoming infected. There is still a risk of breaking with disease later or having internal (e.g. pulmonary) abscesses.
- Johne’s disease. Both serology and fecal culture may be negative and the animal may still be infected (poor sensitivity) and because of the long incubation.
- Abortion diseases. Serology may be difficult to interpret unfortunately. The status of the flock of origin is much more important. Virgin animals are of lower risk – particularly rams, but still can be infected (e.g. ewe lambs with chlamydiophila).

Prophylactic Treatment:

This is giving a medication to an animal that isn’t sick but may be infected. Some diseases can be eradicated with targeted treatment while the animal is in quarantine. Anthelmintic resistant gastrointestinal parasitism is an example of a disease that can be handled in this manner. Sheep are drenched with combination drenches while in isolation to remove as many parasites as possible. After a few days, the sheep is exposed to pasture with the “farm” parasites in order to dilute any remaining resistant infection that it may still be carrying. Standing sheep in a foot bath with 10% zinc sulphate for 20 minutes and repeat in 5 days while in quarantine is another example of prophylactic treatment to lower the risk of introduction of footrot.

Risk of Disease Transmission from Shows and Sales:

Many producers enjoy showing sheep and / or purchasing sheep from sales. Sheep taken to a show can pick up new diseases, although the risk likely varies depending on contact time and disease. Ways to reduce risk include:

- Keeping the actual time at the show grounds to a minimum.
- Attend only shows that require health checks prior to unloading animals
- If possible, keep the sheep on the truck until its event.
- If not, try to house separately from other exhibitors’ animals. Keep an equipment pen between

other sheep and theirs.

- Keep feed and water separate.
- Don't share grooming equipment including stands and clippers.
- Post a sign asking people not to touch the animals.
- Don't share trucks with other exhibitors unless they know the health status of their flock.
- If a trucker is hired, make sure the truck has been washed out and disinfected prior to using.

Sales animals have the same health status as the worst animal in the group and so the sale will set the tone with respect to biosecurity requirements. Veterinarians and producers always talk about "auction barn" horror stories, where unscrupulous dealers may try to dump their problems. Flocks that are concerned about biosecurity should avoid purchasing animals from these venues.

Reducing Risk from Other Animals

Other Livestock on the Farm: For purposes of biosecurity precautions, goats should be treated as sheep as they carry many of the same diseases. Diseases of cattle that can be transmitted to sheep may include: Johne's disease, choroptic mange, BVD, some contagious mastitis pathogens. Llamas and other camelids can be infected with caseous lymphadenitis as well as gastrointestinal nematode parasites. Poultry can carry salmonella and campylobacter. Pigs can be a source of salmonella, leptospirosis and listeriosis.

Adjacent Livestock: Livestock that abut the farm can pose a risk, particularly if fence lines are shared. Q-fever can be carried on the wind. Mange can be transmitted across fence lines. Breaks in the fence allow opportunities for mixing of animals. Make sure that fences are kept in good condition.

Dogs: Hydatid disease (echinococcus), *Cysticercus ovis* and *C tenuicollis* can be transmitted through dog feces. Do not allow dogs to eat fresh dead stock (goats or sheep).

Cats: Cats are the major source of infection from *Toxoplasma gondii* oocysts and are also an important source of *Coxiella burnetii* (Q-fever). While cats are important for control of rodents, cats should be spayed in order to reduce the number of kittens. Toxoplasma oocysts are mostly shed by kittens learning to hunt. Coxiella is mostly shed during parturient events.

Mice, Rats: salmonella, Q-fever, toxoplasmosis, leptospirosis. Rodent control through use of baits, traps, cats.

Dead-stock: Dead animals can be a source of environmental contamination or infection of scavenging animals. All dead stock should be promptly removed, buried, or composted.

Manure: Improperly composted manure may serve as contamination of feed (e.g. pastures, hay) or air (e.g. *Coxiella burnetii*). It should be stored so as to not contaminate water or livestock areas, composted thoroughly, which involves turning and spread on crops (rather than pasture or hay) on still days.

Reducing Risk from Water:

Water is usually derived on the farm from wells. Deep wells with good quality water generally pose no risk but shallow wells can be easily contaminated with surface water. Johnes, parasites, salmonella etc can contaminate any surface water source (ponds, streams). Toxoplasma and cryptosporidia transmission can occur from contaminated streams. Wet areas can encourage snail populations and liver fluke; footrot; environmental mastitis. Water troughs should be kept clean and free of manure.

Reducing Risk from Purchased Feeds:

Purchased feeds can be a source of toxoplasmosis, mycotoxins, salmonella, listeriosis etc. The producer should only purchase from a reputable dealer and should know the biosecurity on their operation. Unfortunately it is not possible to be 100% sure that these diseases will not be present in these feeds.

Reducing Risk from People:

The risk from people is not as great as from animals; however this risk varies depending on the disease. Most purebred sheep producers encourage visits from potential purchasers. As well, feed suppliers, veterinarians, milk truck drivers, salesmen, ultrasound technicians and friendly neighbours can all serve as a source of infection. A few simple procedures can reduce the risk of disease transmission from visitors.

- Have a barrier or gate that prevents direct access from road to barns.
- Include signage at the barrier as well as barn entrance to indicate no entry unless authorized by owner.
- Don't allow entry if the visitor is wearing soiled clothing (including hats, boots and overcoats) or their own barn clothes. Coveralls can be supplied if that person will have contact with the sheep.
- Provide a footbath with fresh disinfectant solution to scrub footwear or provide disposable plastic boots.
- Have facilities to wash hands with disinfectant soap.
- Don't allow visitors to handle animals unless wear gloves or have washed hands with disinfectant soap.
- Insist that veterinarians, ultrasound technicians and shearers come with clean equipment, clean coveralls and freshly washed boots. If not, supervise their cleaning before coming into the barnyard.
- Have own shearing equipment and encourage shearers to: visit the farm first in the day; wear cleanly laundering clothing and clean footwear to reduce the risk of transmission of CLA and external parasites.

Reducing Risk from Equipment:

Some producers routinely share equipment. Specific diseases can be transmitted, e.g. caseous lymphadenitis on clippers. If equipment is to be shared, it should be effectively washed and disinfected first.

Reducing Risk within the Flock (Biocontainment):

This is just as important in helping to reduce the risk of disease transmission.

- Quarantine sick sheep or new additions away from the rest of the healthy flock. E.g. a sheep being treated for a CLA abscess needs to be housed in an abscess pen that is not used for another purpose (e.g. ram pen, lambing pen). If a sheep aborts, move the pregnant ewes away from aborted ewes since the ground is already contaminated. If lambs are scouring, try to have lambs born into a clean environment.
- Use a sound and strategic vaccination program to control those diseases that have good vaccines, e.g. pulpy kidney, tetanus, abortion vaccines.
- Use prophylactic medications (e.g. anthelmintics, coccidiostats) strategically, including using the appropriate dose and timing.
- Promptly remove dead stock so as not to attract predators and vermin and do not allow other sheep to have access to the dead stock or animal products (e.g. placenta). This can be done by burying or composting where allowed.
- Use a suitable and effective predator control program.
- Manure should be properly composted before being spread onto fields. Don't allow access to manure piles, including restricting run-off contamination.

- Utilize the principles of all-in all-out in specific management areas of the farm. This allows disinfection of a premise before introduction of new animals (e.g. diarrhoea outbreak in nursing lambs, do not add newborn lambs to area with sick animals)
- Reduce risk of disease transmission dam to offspring. For most programs with meat sheep, this will be limited to potential replacement animals. The procedure usually involves: snatch at birth; feed low risk colostrum; feed milk replacer; rear away from disease positive flock.
- Control vermin, which can spread disease. This includes preventing access to feed as well as animals.
- If cats are to be used to control vermin, make sure are spayed, are vaccinated against rabies and are kept on an effective de-worming program. Kittens are a risk of toxoplasma transmission. Providing a kitty litter box may reduce risk of defecating in goat feed.
- If dogs are to be used to guard or work with sheep, make sure they are on a tapeworm control program to reduce the risk of cysticercus and hydatid disease. Do not allow dogs to eat dead sheep or goats, including the offal.
- Use single use needles and syringes. Dispose of all used needles and syringes in a plastic container (e.g. bleach jug). Disinfect surgical equipment between uses.
- Use the principles of animal flow and segregation to prevent exposure of young stock to diseases that adults might transmit. Disinfect when moving animals.
- Rams used to breed ewe lambs can be important sources of infection if not also subjected to the same biosecurity checks.
- When a disease outbreak occurs, use standard cleaning and disinfection procedures to lower contamination. This includes pens, feeding equipment, handling equipment and protective clothing.

Reducing Risk Through the Use of Good Record Keeping

All sheep must be well identified and records of treatments, vaccinations, movement must be kept up-to-date. Joining flock health programs (e.g. Ontario Sheep Health Program) disease status programs (e.g. Canadian Voluntary Scrapie Certification program, Ontario Maedi Visna Flock Status program) whenever possible, and being a member of the Canadian On-Farm Food Safety program, will help with the maintenance of good records.