THE DAIRY PRACTICES COUNCIL®

GUIDELINE FOR BIOSECURITY FOR SHEEP & GOAT DAIRIES

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https://www.dairypc.org
evp@dairypc.org

Guideline Preparation and Review Process

Guideline development within Dairy Practices Council (DPC) is unique and requires several levels of peer review. The first step in the process of guideline development starts with a Task Force subcommittee comprised of individuals from industry, regulatory and education interested in and knowledgeable about the subject to be addressed. Drafts, referred to as 'white copies,' are circulated until all members are satisfied with the text. The final white copy may then be distributed to the entire Task Force, DPC Executive Vice President and whoever the Task Force Director feels would add to the strength of the review. Following final white copy review and correction, the next step in the process requires a yellow cover draft that is circulated to the member Regulatory Agency representatives that are referred to as "Key Sanitarians." The Key Sanitarians may suggest changes and insert footnotes if their state standards and regulations differ from the text. After final review and editing the guideline is distributed in the distinctive DPC green cover to people worldwide. These guidelines represent the state of the knowledge at the time they are written.

Disclaimer

The DPC is not responsible for the use or application of the information provided in this Guideline. It is the responsibility of the user to ensure that the information addresses their needs and that any action taken complies with appropriate regulations and standards.

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INTRODUCTION

The purpose of this document is to provide producers with a practical guideline for implementing biosecurity practices on sheep and goat dairies that will increase profitability and prevent unnecessary outbreaks of disease. Maintaining sound biosecurity is important as the introduction of disease into a herd/flock can be costly in terms of increased labor, decreased production, increased veterinary expenditures, and premature culling.

DEFINITIONS

Biosecurity – Security from transmission of infectious diseases, parasites, and pests (Saunder's Comprehensive Veterinary Dictionary 2nd ed. Blood DC, Studdert VP. London: WB Saunders, 1999; 132)

GUIDELINE CONTENT

Disease Control

Sanitation Protocols

To keep herd/flocks free of incoming disease, producers must be aware of the various routes by which pathogens can enter a farm including; visitors, vehicles, and feral animals. Visitors should be kept to a minimum and should be directed to report to the farm office prior to entering any areas of the farm that house animals. Ideally, visitors should not have had contact with other herd/flocks for a minimum of 48 hours prior to entering the farm and should not be wearing clothing that has not been washed since last being worn on another farm. A boot wash should be available for visitors and boots should be scrubbed free of visible soil using a strong disinfectant such as potassium peroxymonosulfate and sodium chloride or a phenolic compound. Alternatively, disposable boots and coveralls may be made available to visitors.

Vehicle traffic onto the farm should be limited to those vehicles that need to enter the farm such as grain trucks, regulatory officials and milk haulers. Ideally, grain trucks could offload onto a farm vehicle at another site. If this is not possible, the vehicle should go through a wash process. Other vehicles should be left outside the farm and visitors instructed to enter the premises on foot.

Rodents, birds, cats, and insects have been shown to transmit diseases including salmonellosis, leptospirosis, toxoplasmosis, and pink eye. Reducing the access of these populations to the herd/flock's feed and water supply will help decrease the risk of introducing diseases into the herd/flock. In addition, the frequent removal of manure, animal remains or other organic waste capable of harboring and transmitting disease will also lower the risk of introducing diseases.

Screening of Purchased Additions

Each producer must decide which diseases they are most concerned about and screen animals accordingly. The diseases of greatest concern for a dairy will vary both from region-to-region and from farm-to-farm. For example, a producer that derives income from the sale of embryos or semen may be more concerned about diseases with export restrictions, such as bluetongue, than a producer that derives his income solely from the sale of meat and milk. The diseases with the greatest biosecurity risk in the United States will be discussed separately.

Prior to entering a herd/flock, potential purchased additions should be screened for the presence of contagious diseases. For many diseases (i.e., pink eye, lice, foot rot, sore mouth, etc.), this can be accomplished by a thorough physical examination. All additions should have a thorough physical examination prior to entering a new herd/flock and any animals suspected of having a contagious disease should be rejected or subjected to further testing. The detection of diseases such as Johne's disease, Caprine Arthritis Encephalitis (CAE), or contagious mastitis will require herd/flock history and diagnostic tests including serology and culture.

When interpreting the results of any laboratory test, it must be kept in mind that no test is perfectly accurate. All tests will yield both false positive and false negative results on occasion. The terms sensitivity and specificity are used to describe the reliability of a given test. A highly sensitive test will detect minute quantities of antibodies or pathogens in a test sample. As the sensitivity of a test increases, its ability to identify affected individuals increases. Therefore, tests with high sensitivity will give few false negative results. Specificity describes the ability of a test to yield a positive result in only those individuals that truly have the disease in question. As the specificity of a test increases, its ability to detect unaffected individuals increases. Therefore, tests with high specificity will give fewer false positive results. Before testing for a given disease, the sensitivity and specificity of the available tests should be considered so that the results can be correctly interpreted.

Quarantine Protocols

Upon arrival, purchased additions should be quarantined for a minimum of one month. Diseases with an incubation period of less than one month will become apparent during this time and the affected animals can either be treated or culled prior to introducing the animals to the rest of the herd/flock. Note that diseases with an incubation period that is longer than the quarantine (i.e., Scrapie and Johne's disease) may not become apparent during the quarantining period. While under quarantine, animals should be fed and housed separately, and common equipment and clothing should not be used between the quarantined animals and the remainder of the flock. During the quarantine, animals should be dewormed and have their feet trimmed to check for signs of foot rot. A fecal exam can be performed prior to introducing the additions to the main flock in order to ensure that the anthelmintic used was efficacious.

Vaccination and Prophylactic Treatments

Prior to mixing animals from more than one source, the vaccination history of both the original herd/flock and the new additions must be optimized and this may involve vaccination of both purchased additions and the main herd/flock prior to introducing new animals. Care should be taken to ensure that both primary immunizations and any required boosters are given at least one month prior to introducing the new arrivals. The specific diseases vaccinated against will vary on a case-by-case basis but may include diseases such as rabies, sore mouth, foot rot, caseous lymphadenitis, chlamydiosis, vibriosis, and the clostridial diseases. If vaccination for

a particular disease is performed prior to the screening process, screening tests for that specific disease may become more difficult to interpret.

Diseases of Significant Biosecurity Concern in the United States

The diseases described in the chart below should be of concern to all sheep and goat dairies. These diseases have been selected based upon their frequency of occurrence, mode of transmission, and the severity of clinical signs they induce. All herd/flocks should examine their animals for the presence of these diseases regardless of whether new animals are being added to a herd/flock or not. Once the incidence of a disease within a herd/flock is known, control measures can be introduced into the herd/flock to eliminate the disease and future additions can be screened so as to prevent the introduction of new diseases into the herd/flock.

Table 1. Diseases that can be detected by physical examination during the screening process

Disease	Species	Signs	Diagnosis	Comments
Pink eye	S/G	Tearing, squinting, cloudy corneas	Physical examination	Many organisms may be responsible, culture required to determine the exact cause
External parasites (lice, mange, ticks, keds, etc.)	S/G	Parasites visible on skin, itching, rough hair coat, skin lesions, poor body condition	Physical examination	
Foot rot	S/G	Lameness, swollen, reddened feet, underrun soles	Physical examination	Non-clinical carriers are a possibility
Sore mouth (orf , contagious ecthyma)	S/G	Crusty scabs on the lips, particularly at mouth corners and teats of nursing females	Physical examination	Disease can be transmitted to people
Respiratory Disease	S/G	Coughing, inappetence, fever, nasal discharge, depression	Physical examination	Many possible agents including viruses, bacteria, and lungworms
Ringworm	S/G	Loss of hair, scaling, crusting	Physical examination and culture	Handling infected animals may lead to skin infections in people
Meningeal Worm	S/G	Lameness, loss of balance, paralysis	No definitive pre-mortem test currently exists	Transmitted from deer by slugs and snails, Elimination of deer and mollusks or frequent deworming may help prevent this disease

Table 2. Diseases that require testing to detect during the screening process

Disease	Species	Signs	Diagnosis	Comments
Mastitis	S/G	Abnormal milk or illness in ewe or doe; Infection without clinical signs is possible	Physical examination and culture of milk	All milking animals should culture negative for *Streptococcus agalactiae*, *Staphylococcus aureus*, and *Mycoplasma* prior to entering a new herd/flock; Re-culturing milk samples during the quarantine period will help ensure absence of infectious mastitis
Scrapie	S/G	Itching, loss of balance, convulsions, chronic wasting; Animals may carry the disease for up to three years before showing clinical signs	No approved pre-mortem test is currently available; A test based upon immuno-histochemistry of the third eyelid is under investigation but awaits federal approval; Individuals can be tested for genetic resistance to infection by a commercially available DNA test	Buying from farms enrolled in the federal Scrapie Control Program may help prevent the introduction of this disease into a naïve herd/flock
Johne's Disease	S/G	Chronic wasting with a good appetite, rarely diarrhea	Fecal culture in goats, AGID blood test in sheep or goats	False negative fecal and blood test results are common, especially in cases of early infection. AGID sensitivity in early cases: 20%. AGID sensitivity in chronic cases: 90%. Specificities of fecal and blood tests are both high
Caseous Lymphadenitis	S/G	Enlarged lymph nodes usually on the head and neck that may drain yellow pus; Abscessation of internal lymph nodes may not be apparent or lead to chronic wasting	Physical examination for blood test for infection of internal lymph nodes	Sensitivity and specificity results are not available; Discuss accuracy of this test with lab prior to submission

Disease	Species	Signs	Diagnosis	Comments
Ovine Progressive Pneumonia (Maedi-Visna) (OPP)	S	Progressive weight loss accompanied by coughing and difficulty breathing; Arthritis and a hard, swollen udder with no milk at parturition are less common signs	AGID blood test sensitivity 91.5% AGID blood test specificity 100% ELISA blood test sensitivity 91.5% ELISA blood test specificity 100%	Individuals may carry the disease for up to three years before showing clinical signs
Caprine Arthritis Encephalitis (CAE)	G	Fatal neurologic signs in young, progressive arthritis or a hard, swollen udder with no milk at parturition in older animals	AGID blood test sensitivity 94% AGID blood test specificity 100% ELISA blood test sensitivity 91% ELISA blood test specificity 100%	Some individuals may carry and pass the CAE virus without showing signs of illness themselves
Brucellosis	S	Late-term abortions or weak offspring in sheep; Swollen epididymides in rams	Examine rams for swollen epididymides, evaluate and culture semen. Blood test, milk ring test, or culture and examination of appropriate samples following abortion	Brucellosis may be transmitted to people by direct contact with infected animals or by the consumption of milk infected with the organism
Brucellosis	G	Mid-to-late-term abortions	Blood test, milk ring test or culture and examination of appropriate samples following abortion	Brucellosis may be transmitted to people by direct contact with infected animals or by the consumption of milk infected with the organism
Tuberculosis	G	None, chronic weight loss, or mild respiratory signs	Intradermal tuberculin test	Tuberculosis may be transmitted to people by direct contact with infected animals or by the consumption of milk infected with the organism

Table 3. Diseases of Some Biosecurity Concern in the United States

The diseases listed in the table below may be of biosecurity concern in some herd/flocks. Consult your veterinarian or extension agent to determine if testing for these diseases is appropriate for your herd/flock.

Sheep and Goats	Sheep and Goats	Goats
Anaplasmosis	Chlamydial Arthritis	Capripox
Bluetongue	Eperythrozoonosis	Caprine herpesvirus
Border Disease	Pseudorabies	Warts (udders of white Saanen
Cache Valley Virus	Vesicular Stomatitis	
Q Fever	Ulcerative Dermatosis	

Table 4. Foreign Diseases of Biosecurity Concern

The diseases listed in the table below are of biosecurity concern for both sheep and goats in many regions of the world

Akabane virus	Foot and Mouth Disease	Peste des petits ruminants
Borna disease	Louping-ill	Wesselsbron disease

Recommendations

The following steps are recommended as a starting point toward achieving a biosecure farm:

- Maintain a closed herd/flock and do not accept animals from other farms
- Prevent people from introducing diseases to your farm by limiting visitors to only those essential to farm business; providing a boot wash for those entering the facility; and directing people to the farm office prior to entering any buildings that house animals.
- Visitors should not have had contact with other animals for a minimum of 48 hours prior to entering the farm and should not be wearing clothing that has not been washed since last being worn on another farm. Disposable boots and coveralls may be made available.
- Control rodent, bird, and insect populations.
  - Clean out old feed
  - Store feed in closed containers
  - Remove harborages
  - Seal entry points from birds and rodents, screening of windows
  - Frequently drain stagnant pools of water, and handle manure such that fly breeding areas are minimized
- Provide adequate ventilation in barns.
- Examine your herd/flock for diseases on Table 1. Contact your veterinarian for an appropriate treatment plan.
- Examine your herd/flock for signs of mastitis and culture the milk as necessary to determine if any of your animals are infected with contagious mastitis.
- Perform a fecal exam on your animals to look for internal parasites and coccidia. Contact your veterinarian for specific protocols for your area
- Examine your herd/flock's health records and determine if any animals have been affected with signs of chronic weight loss, neurological disorders, abortion, or arthritis. If these conditions have been seen on your farm, consider testing for the appropriate diseases as described in Table 2.

- Vaccinate your herd/flock against tetanus and the clostridial diseases of importance in your area. Consult your veterinarian for a vaccination plan. Vaccination against foot rot, caseous lymphadenitis, chlamydiosis, sore mouth, rabies (sheep) and vibriosis should be considered on a farm-by-farm basis.

Once diseases already present on the farm have been controlled, the following steps should be performed if new animals are to be introduced to the farm:

- Purchase animals from farms with a good history of disease control. Avoid purchasing animals from auctions or from several different farms, as the intermingling of animals from several different sources can increase the likelihood of a disease outbreak.
- All purchased additions should be quarantined for one month. Animals should not be in physical contact with the existing herd during the quarantine period. Separation of at least 40 feet is recommended. Deworming and trimming feet to check for signs of foot rot should be performed during this period. Handling of quarantined animals should be done after the rest of the herd/flock.
- Perform a thorough physical exam on animals prior to purchase as described earlier.
- Ask to see the farm's medical records and question sellers about the history of abortion, neurological disease, chronic wasting, mastitis, and diarrhea on their farms. If any of these diseases have been seen on their farms, the purchase of animals from these farms should be carefully considered. Some additional actions that could be taken include:
  - Fecal exam, culturing for mastitis, testing for diseases as listed in Table 2.
  - Purchased additions should be vaccinated according to your herd/flock's protocol approximately 28 days prior to entering the herd/flock.

Once biosecurity practices have been established on your farm, the following steps should be performed to prevent the emergence of disease:

- Monitor all animals for signs of illness.
- Enroll in the Federal Scrapie-Free Certification Program.
- Vaccinate according to your vaccination protocol.
- Deworm according to your veterinarians recommended protocol.
- Culture all milking animals annually for the presence of contagious mastitis. Monitor commingled somatic cell counts and bacteria counts on milk sold for processing.
- Test any animals with signs of weight loss, abortion, diarrhea, hard bag, arthritis, or neurological disease as described in Table 2.
- Test annually for Johne's disease and either OPP or CAE and cull all positive animals.
- Keep individual health records for all animals for at least two years which include any illnesses noted, treatments given, and eventual outcome of the illness.
- Increase education on prevention techniques to improve your own farm's biosecurity.

Conclusion

As herd/flocks become larger, animals travel longer distances, and the public becomes increasingly concerned about the use of chemotherapeutics in food animals, the need for biosecurity programs becomes even greater. Biosecurity programs are a critical means by which to avoid the potentially disastrous consequences of introducing a new disease into a naïve herd/flock. By maintaining strict biosecurity, it is hoped that the incidence of disease within herd/flocks can be reduced and that this will lead to healthier herd/flocks, a decreased need for medications, and greater profitability.

REFERENCES

- Saunder's Comprehensive Veterinary Dictionary 2nd ed. Blood DC, Studdert VP. London: WB Saunders, 1999; 132

APPENDIX

None

CURRENT ACKNOWLEDGEMENTS

**This guideline was developed by contributors who are of experienced individuals in a related field(s). The acknowledged persons are included with their professional affiliations and may be contacted via a DPC Officer(s) and/or Task Force Director(s) for questions or concerns.*

Officers

Name	Position
Keith Hay	President
Wendy Landry	Vice President
Mary Wilcox	Executive Vice President

Task Force Director

Michelle Steinmetz, Small Ruminants

Lead Author(s)

Eugene C. White, DVM, George Saperstein, DVM

Contributor(s)

- Lisa Burnett, DVM (*Nevada Dept. of Agric*.)
- Nicole Neeser, DVM *(Minnesota Dept. of Agric.)*
- Oscar *Cox* *(New York State Depart. Of Agric. and Markets)*
- Ali Collins *(WDATCP)*
- Isaac Espinoza *(Meyenberg Goat Milk)*
- Laurie Sippel *(WDATCP)*

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Version(s)

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- Eugene C. White, DVM *(Affiliation)*
- George Saperstein, DVM *(Affiliation)*