

Common Microbial Diseases in Sheep and Goats

Marcy Ward and John Wenzel¹

aces.nmsu.edu/pubs • Cooperative Extension Service • Guide B-128

The College of Agricultural, Consumer and Environmental Sciences is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through academic, research, and Extension programs.



New Mexico State University
aces.nmsu.edu

INTRODUCTION

Microbial diseases pose a huge challenge for the sheep and goat industry. Loss of production through reduced reproduction, growth, or wool production can have significant impacts on an operation’s profitability. Up to 18% of death loss in lambs was related to bacterial and viral diseases (USDA, 2014). However, less than 40% of sheep and goat operations surveyed vaccinate for disease. Table 1 demonstrates the prevalence of some of the diseases described in this publication. The data indicate little or no improvement in disease control in small ruminants. Understanding a disease’s mode of action will help producers be more effective in controlling these diseases in their own operation.



© Xxcozmoxx | Dreamstime.com

JOHNE’S DISEASE

Also known as paratuberculosis, this disease is caused by the bacteria *Mycobacterium avium* subspecies *paratuberculosis*. The bacteria cause lesions on the intestinal wall, reducing an animal’s ability to absorb nutrients. Animals are typically exposed at birth, but the bacteria can also be

Table 1. Percentage of Operations Suspected of Disease in Small Ruminants Based on Veterinary Diagnosis (USDA, 2014)

Disease	Diagnosed 2001 (%)	Diagnosed 2011* (%)
Johne’s disease	33.3	40.8
Ovine progressive pneumonia	21.7	24.6
Caseous lymphadenitis	24.9	24.1
Enterotoxemia	30.9	19.7
Clostridials (other than enterotoxemia)	17.3	17.7
Coccidiosis	50.0	37.0

*2011 is the latest data available through USDA reporting.

¹Respectively, Extension Livestock Specialist and Extension Veterinarian, Department of Extension Animal Sciences and Natural Resources, New Mexico State University.

transferred in utero. *Mycobacterium avium* ssp. *paratuberculosis*, however, is known to lie dormant for years before clinical signs are observed. The primary challenge with Johne's is that the infected animal will continue to shed the bacteria in fecal matter and milk well before showing signs of the disease, thus potentially exposing the entire herd. There is currently no effective treatment for Johne's disease.

Transmission

- Primarily through contaminated fecal matter.
- Consumption of milk by offspring of animals infected with the disease.
- Congenital infection in utero.

Common signs

- Significant weight loss (most common in older animals) despite adequate appetite and feed consumption.
 - Occurs even with good parasite management.
- Manure may have soft and pasty appearance in animals.
- Many animals remain asymptomatic and are mere vectors of the disease to the rest of the herd.

Prevention

- Currently, there are no vaccines available in the U.S. for Johne's in sheep and goats.
- Testing fecal samples through a veterinary laboratory can help determine the presence of the disease.
- Regular testing of feed, water, and pasture sources for the presence of *M. avium* ssp. *paratuberculosis* is recommended.
- Strict culling criteria should be implemented.
 - Cull all ewes that have tested positive for the disease. It is also recommended to cull their offspring as well.
- Proper hygiene management in confined areas.
 - Disinfect pens and remove manure regularly.

ENTEROTOXEMIAS (*CLOSTRIDIUM PERFRINGENS*)

Otherwise known as "overeaters disease," enterotoxemia is a group of intestinal diseases caused by the bacterium *Clostridium perfringens*. There are four strains of this bacterium. Type A is a non-toxic strain normally found in the digestive tract. Types B, C, and D, however, are strains that produce lethal toxins that attack the digestive system when the animal is stressed or their diet changes too rapidly. These bacteria are quite virulent and cause rapid death in many species of animals.

Common signs

- Listless, reduced to no appetite, acute diarrhea (more common in goats), dysentery, and abdominal pain.
- Incoordination, neurological issues, excitement, convulsions, and death.

C. perfringens B and C

Type B, also called lamb dysentery, primarily affects neonates (newborns), but can also affect unvaccinated adult sheep and goats. Death often occurs before intervention or treatment can take place. Crossbred animals tend to be more resistant.

Transmission

- Exposure to fecal matter from adult carrier.
- Nose to nose (or direct) exposure to animals actively experiencing the disease.
- *C. perfringens* can live temporarily in soil following an outbreak.

Prevention

- Vaccinate pregnant dams during their last trimester with a clostridial vaccine (7- or 8-way) that includes *C. perfringens* types C and D protection.

C. perfringens D

Type D is more common in sheep than goats, but goats should still be vaccinated. It typically occurs with nutrient-rich diets (grain-based or lush forage). Death often occurs before intervention or treatment can take place.

Transmission

- *C. perfringens* type D exists in the gastrointestinal tract of the animal. It is likely introduced from bacterial sources in the soil. This type of bacteria does not cause the host clinical problems until conditions allow for its prolific growth.
 - A rapid change of diet (poor- to high-quality) or dramatic change in weather has been associated with the onset of the disease.

Prevention

- Vaccinate with a clostridial vaccine (7- or 8-way) that includes *C. perfringens* types C and D. Vaccinate young animals at 30 days, with a booster at weaning. Stay current with annual vaccines for adult animals during last trimester.
- Avoid rapid change of diet from forage to grain, or dry hay to lush grass.

PROTOZOAL DISEASES

Coccidiosis is a protozoal parasite disease that primarily affects young and newborn animals. The genus that primarily affects small ruminants is *Eimeria*, and there are several species within this genus that affect sheep and goats. Although coccidiosis is a protozoal disease, it is included here because its clinical signs are similar to many bacterial diseases. It affects predominantly young animals, but any animal is susceptible under the right conditions.

Transmission

- Exposure to affected fecal matter, urine, feed, or water.

Common signs

- Diarrhea, bloody diarrhea.
- Dehydration.
 - To check for dehydration, tent the skin; the animal is dehydrated if skin is slow to retract.
- Listless.

Prevention

- Keep lambing and kidding areas clean and dry.
- If possible, rotate lambing and kidding areas yearly.
- If high risk, apply coccidiostat products to feed or water as a precaution.
 - High risk = Previous presence of disease; warm, wet weather.

Treatment

- Coccidiostat products.
 - Drenches are most effective in applying appropriate dose.
 - Products for feed or water are also available; however, treatment level may vary between animals.
- Antibiotic therapy (consult your veterinarian for proper treatment).

Toxoplasma gondii is another protozoa that affects multiple livestock species. It is an important cause of abortion in small ruminants.

Caution

T. gondii can be transmitted to humans. Handle all sick animals, especially aborting ewes or does, with gloves and protective clothing to prevent cross contamination. Transmission may occur when animals come in contact with affected birthing fluids, contaminated feed, or cat feces.

MANNHEIMIA HAEMOLYTICA AND PASTEURELLA MULTOCIDA

Respiratory disease is the leading cause of death in livestock. *Mannheimia haemolytica* and *Pasteurella multocida* are the bacteria that cause the most common form of pneumonia in sheep and goats. Young stressed lambs and kids at weaning are the most susceptible.

Common signs

- Poor appetite.
- Nasal discharge and labored breathing.
- Listless and depressed.
- Temperature higher than 103.8°F.

Prevention

- Consult your veterinarian for advice on preventive vaccines for *M. haemolytica*, *P. multocida*, and other respiratory diseases.

Treatment

- Antibiotic therapy (consult your veterinarian for proper treatment).
- Probiotics to help stimulate appetite.
- Increase nutrient density of the diet.

TETANUS

Tetanus is a clostridial disease caused by *Clostridium tetani*. These bacteria are present in soils and the feces of most animals. Because of its widespread presence, producers must assume all animals are susceptible. Unprotected animals exposed to *C. tetani* can develop the disease through wounds that result in an anaerobic environment (lacks oxygen). Also known as “lockjaw,” the extreme muscle rigor is this disease’s most noted symptom. Tetanus is generally fatal but can be prevented.

Transmission

- *C. tetani* spores live in the ground. When an animal suffers a puncture wound, it is most likely exposed to this disease-causing bacteria.
 - Transmission most commonly occurs during castration, docking, and shearing.

Common signs

- In ruminants, chronic bloating may be an indication of the onset of tetanus.
- Stress events (e.g., handling, loud noises) resulting in muscle spasms, nostril spasms, prolapse of the third eyelid, or constricted facial muscles all may be early indications of tetanus.



neous abscessing. A combination of these effects can result in condemnation of a carcass, offal, or parts of the fleece.

Transmission

- Utilizing the same needle from vaccinating an affected animal on a healthy animal.
- Exposure to both internal and external abscess contents due to rupture.
- Facility contamination; potentially spread by fecal matter exposure.
- Open wound contamination from shearing or facility exposure.

- Progression includes animals lying prone with legs stiff and stretched out, and the head raised up or back.
- Death generally occurs within 72 hours of the first symptoms.

Prevention

- Include the tetanus option in your clostridial (7-way+) vaccination program.
- Incorporating a booster protocol is recommended for optimal protection.
- Use good hygiene where management practices increase risk of exposure.
 - Disinfect tools between animals.
 - Irrigate open wounds with a drying agent (iodine).

Treatment

- If caught early enough, an anti-toxin is available.
- Heavy doses of low-grade, fast-acting antibiotics may be helpful.
- Consult with your veterinarian for proper treatment; however, a successful recovery rarely occurs.

CASEOUS LYMPHADENITIS (CLA)

Though rarely fatal, this bacterial disease can have significant economic impacts on a producer. The bacterium known as *Corynebacterium ovis* causes lymphatic abscesses throughout the body, which are most visibly seen about the neck and head of the animal. If not treated, CLA can lead to respiratory distress, mastitis, arthritis, and other subcuta-

Common signs

- Large and numerous abscesses about the head and neck.
 - These abscesses can also occur throughout the body (muscle and organ tissue) and may be undetectable.
- Affected animals can experience weight loss, weakness, and coughing.
 - Extreme cases are rare, but can cause death.

Prevention

- Vaccination can be helpful.
 - For optimal results, vaccination should be done consistently year to year.
 - Best to vaccinate at weaning and follow with a booster 30 days later. Then, vaccinate entire herd annually.
 - The sheep vaccine is different from the goat vaccine. Texas Vet Labs now has a vaccine specifically for goats. Consult your veterinarian before purchasing.
- Cull any animal that contracts the disease.
- Quarantine any new animals and vaccinate.
 - If possible, ask previous owner about their vaccination history.
 - Be sure to inspect for abscesses. If found, contact a veterinarian for a confirmed diagnosis.
- Do not introduce new animals into your herd from a premise where CLA is known to be present.

Treatment

- Practical and effective treatment for controlling an outbreak is very labor-intensive and difficult.
- Surgical removal of subcutaneous abscesses by a veterinarian may be an alternative if the animal has significant value.

Control

- Proper hygiene management in confined areas and working facilities.
 - Disinfect pens and keep clean of manure on a regular basis.
- If an affected animal is detected, remove it from the group and thoroughly disinfect the tools and the area where shearing is taking place.

REPRODUCTIVE DISEASES

Reproductive diseases can have the greatest economic impact on livestock production at the farm and ranch level. Though rarely fatal, these diseases reduce lamb and kid crops, reduce herd efficiency, increase costs, and shorten the productive life of the female. Some reproductive diseases are transmitted sexually, while others can be contracted through contaminated feed, manure, or water sources. The following are reproductive diseases that can occur in sheep and goats.

CAMPYLOBACTER FETUS

Formerly called “vibriosis,” this bacterial disease is the primary cause of late-term abortions in ewes. *Campylobacter fetus* is highly contagious and can create abortion outbreaks within a flock (i.e., when greater than 20% of ewes have late-term abortions within a short period of time). This disease has been noted to cause a loss of up to 70% of a lamb crop in one year. Goats are less susceptible; however, prevention through vaccination should be considered in their health management plan as well.

Transmission

- Fluids from one affected aborted fetus contaminate the ground, which exposes multiple animals to the disease.
- Open water sources become contaminated through affected fecal matter and urine.

Common signs

- Brownish discharge from vulva.
- Aborted fetus during last trimester of gestation, followed by multiple late-term abortions.

- Lambs born to term are either born dead or very weak.
- Afterbirth is pale orange and thick.

Prevention

- Isolate any new animals until a full round of vaccines and boosters has been administered (minimum 60 days).
- Vaccinate ewes and does shortly before breeding season. Follow this with a booster at least 60–90 days later (before they enter their last trimester).
- Antibiotics can be added to their feed during their last trimester of pregnancy; however, this may not be fully effective against some strains of vibrio.
 - NOTE: Feedstuffs that contain antibiotics now require a **Veterinary Feed Directive Order** from your veterinarian.

Treatment

- Though antibiotics help, it is very difficult to stop the spread of the disease once present.
- Isolate any suspect animals immediately.
- Burn all dead lambs and afterbirth.
- Flocks may develop an immunity to the disease after exposure, but prevention management should always be employed. First-time lambing ewes and naïve ewes are most susceptible.

Caution

Campylobacter fetus can be transmitted to humans through direct contact with affected tissue. It is highly recommended to handle the ewe and any afterbirth or dead lambs with gloves and protective clothing.

CHLAMYDIA

Chlamydiaceae is a family of bacteria known to cause disease in many different animal species. Of the nine sub-species of *Chlamydia* bacteria, *C. abortus* is specifically found to affect sheep and goats. The disease is transmitted predominantly through exposure to contaminated fecal matter and causes late-term abortions, stillbirths, or weak lambs. Afterbirth and vaginal discharge will also contain *C. abortus*.

Transmission

- Exposure to contaminated fecal matter, aborted fetuses, afterbirth, or vaginal discharge.
 - Fluids from these tissues can contaminate the grass or water.

Common signs

- Ewes and does infected with *C. abortus* will experience late-term abortions, stillbirths, and weak lambs and kids.
- If the newborn survives, they can also be infected with the disease and will likely experience respiratory distress that leads to pneumonia.
 - The newborns will be lethargic and weak, with nasal discharge that goes from clear to thick, heavy, mucosal discharge.

Prevention

- An annual vaccine protocol is recommended to keep females current on their immune status.
 - A chlamydia vaccine should be given 60 days pre-breeding and 30 days post-breeding each year.
 - Antibiotics can be added to their feed during their last trimester of pregnancy.

Treatment

- Clinical signs of a disease do not always clearly define the cause. Therefore, it is recommended that affected animals be tested by a veterinarian before adequate treatment is applied.

Caution

C. abortus can be transmitted to humans through direct contact with affected tissue. Pregnant women are at the greatest risk because exposure can result in fetal death or abortion. It is highly recommended to handle the ewe or doe and any afterbirth or dead lambs or kids with gloves and protective clothing.

Q FEVER

Coxiella burnetii is a species of bacteria found in small ruminants. Though uncommon, the disease can cause abortion, stillbirths, or weak lambs and kids. External signs of Q fever in the animal are also rare and difficult to diagnose. The main issue with this disease, besides absorptions in the animal, is its transmission to humans.

Transmission

- Exposure to contaminated fecal matter, aborted fetuses, afterbirth, or vaginal discharge.
- Aerosol transmission is also possible with this bacteria.
- Contact with as little as a single organism can cause disease.

Common signs

- In sheep and goats:
 - Clinical signs seldom occur. Incidences of abortion, stillbirths, and weak lambs and kids have been observed.
 - Neonates exposed to infected tissue can become weak and lethargic.
- In humans:
 - Even after known exposure to *C. burnetii*, people may be asymptomatic.
 - Symptoms can include mild flu-like illness and fever, headache, and muscle pain or stiffness.
 - A typical pneumonia is also possible, which can lead to death (in immunocompromised individuals).
 - Granulomatous hepatitis, a rare liver disease, can occur.
 - In rare cases, meningitis and heart ailments can occur.

CONCLUSION

Developing a good health management plan begins with a consultation with your veterinarian. Many diseases found in sheep and goats can be region-specific. Therefore, it is important to incorporate a vaccination program best suited to your situation and environment. For more information, see NMSU Extension Guide B-127, *Sheep and Goat Vaccine and Health Management Schedule* (https://aces.nmsu.edu/pubs/_b/B127.pdf).



Marcy Ward is the Extension Livestock Specialist at NMSU. She received her B.S. and M.S. in animal science from Colorado State University and NMSU, respectively, and her Ph.D. in ruminant nutrition from North Dakota State University. She was most recently the Beef Program Director at Colby Community College in Colby, KS.

REFERENCES

- Buergelt, C.D., S.S. Bastianello, and A.L. Michel. 2004. Paratuberculosis. In J.A.W. Coetzer and R.C. Tustin (Eds.), *Infectious Diseases of Livestock*, vol. 3 (pp. 1994–2010). Oxford University Press.
- Department of Primary Industries and Regional Development, Western Australia. 2018. Ovine campylobacteriosis (formerly ovine vibriosis). Retrieved May 1, 2018, from <https://www.agric.wa.gov.au/livestock-biosecurity/ovine-campylobacteriosis-formerly-ovine-vibriosis>
- Kelly, P.J. 2004. Q fever. In J.A.W. Coetzer and R.C. Tustin (Eds.), *Infectious Diseases of Livestock*, vol. 1 (pp. 565–572). Oxford University Press.
- Odendaal, M.W., and N.P.J. Kriek. 2004. Tetanus. In J.A.W. Coetzer and R.C. Tustin (Eds.), *Infectious Diseases of Livestock*, vol. 3 (pp. 1878–1884). Oxford University Press.
- Paton, M.W., M.G. Collett, M. Pèpin, and F.F. Bath. 2004. *Corynebacterium pseudotuberculosis* infections. In J.A.W. Coetzer and R.C. Tustin (Eds.), *Infectious Diseases of Livestock*, vol. 3 (pp. 1917–1930). Oxford University Press.
- Reinhold, P. 2013. Overview of chlamydiosis. Merck Veterinary Manual. Retrieved May 1, 2018, from <https://www.merckvetmanual.com/generalized-conditions/chlamydiosis/overview-of-chlamydiosis>
- Scott, P.R. 2014. *Pasteurella* and *Mannheimia* pneumonias in sheep and goats. Merck Veterinary Manual. Retrieved May 1, 2018, from <https://www.merckvetmanual.com/respiratory-system/respiratory-diseases-of-sheep-and-goats/pasteurella-and-mannheimia-pneumonias-in-sheep-and-goats>
- Stewart, C.G., and B.L. Penzhorn. 2004. Coccidiosis. In J.A.W. Coetzer and R.C. Tustin (Eds.), *Infectious Diseases of Livestock*, vol. 1 (pp. 319–331). Oxford University Press.
- United States Department of Agriculture. 2014. Sheep 2011. Part IV: Changes in health and production practices in the U.S. sheep industry, 1996–2011. Fort Collins, CO: USDA–APHIS.

Contents of publications may be freely reproduced, with an appropriate citation, for educational purposes. All other rights reserved. For permission to use publications for other purposes, contact pubs@nmsu.edu or the authors listed on the publication. New Mexico State University is an equal opportunity/affirmative action employer and educator. NMSU and the U.S. Department of Agriculture cooperating.