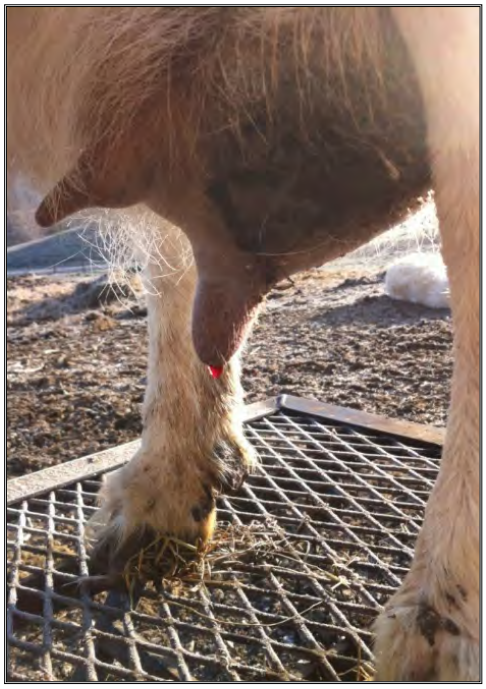
Mastitis in Small Ruminants

by Jesse Lay

Mastitis is very common in domestic livestock and can lead to many economic losses for producers. Losses may come through not only decreased production, but also loss of breeding stock, lower weaning weight of offspring or decreased milk quality for dairy animals. Mastitis is a term that refers to an inflammation or infection of the mammary glands (udder). It may be caused by many different types of bacteria or caused by certain viruses and, rarely, fungus. Throughout this article, we will discuss specific causes, symptoms, treatments, and the risk factors and prevention

Milk is a highly nutritious substance, with a high amounts of proteins, fats, and sugars, designed to support the development and rapid growth rates of young offspring. But just as its nutrient content will allow the young to flourish, it is also nutritious for any harmful bacteria that gain their way into the udder. Depending on the type of bacteria that enter the udder, the tissue damage can be mild or very severe. Certain bacteria, such



as e coli, produce toxins that will enter into the animal's blood stream and make the ewe/doe extremely sick and this can be fatal. In many cases even after the infection is treated, scar tissue replaces the milk producing cells, decreasing the ability to produce milk, therefore ending the productive life of the dam.

Bacterial causes are often divided into two categories, contagious or environmental. Contagious bacteria spread directly from one animal to another, or in dairy farms, spread through milking equipment. Environmental causes come from the animals' surroundings, such as bedding or animal laying in unsanitary conditions. If a doe/ewe has mastitis, a milk sample may be sent to a veterinary diagnostic lab for culture and identification of the specific bacteria causing the infection. Identifying the type of bacteria, can help determine how the animal was infected. This will be helpful in treatment and can also provide information on what can be done to prevent other animals from being infected. Simply looking at the udder or milk will not indicate the cause of an infection. The lab will also be able to test multiple antibiotics to see which will be most effective in treating the infection (which antibiotics have a higher sensitivity).

Contagious	Environmental
Staphylococcus aureus	Coliforms *(E. coli)*
Staphylococcus species	*Streptococcus species*
Mannheimia hemolytica	*Klebsiella spp*
Mycoplasma spp	*Pseudomonas*
Caprine Arthritis and Encephalitis or Caseous Lymphadenitis	Other *(Cryptococcus, Candida, Listeria, Prototheca)*

Escherichia coli (E. coli) and Streptococcus are bacteria that often originate from feces or manure. These are considered environmental because most likely the animals' udder came in contact with feces from laying in dirty barns or pens. While these are not considered contagious, multiple animals may be affected if they are housed in the same condition.

Staphylococcus is a frequent bacterial culprit in mastitis. Bacteria in this category commonly lives on skin of humans or animals. When it enters the udder, it can cause severe damage. Staph species are also frequently resistant to certain classes of antibiotics. In dairy operations, it is considered very contagious and can easily be spread by milking equipment and workers hands which transmit the bacteria from one animal to the other in the milking process. "Blue Bag" in sheep and goats is caused byStaphlococcus aureus and can result in death of the affected animal. It is a sudden and very severe infection where the udder is extremely hard and cold to the touch with a yellow sticky fluid coming from the teat instead of milk.

Mannheimia species are a class of bacteria that we commonly associate with pneumonia. When young animals that are suffering from pneumonia nurse their dam, the bacteria in their saliva can travel in to the teats and set up severe infections and inflammation. This type of mastitis if left untreated may also cause a necrotic infection, leading to the mammary tissue dying and udder turning black and cold.

Contagious Ecthyma (Orf, Sore mouth) as most of us know causes sores on mucous membranes. The most common scenario is sores around the mouth of young kids. Occasionally, these sores are also seen on the teats of sheep and goats. These lesions appear as angry and ulcerated sores that are very painful. The doe/ewe may not let the kid nurse due to the discomfort and this may lead to mastitis. Mastitis may also be a secondary problem if the ulcer is deep enough to get into the teat canal.

Caprine Arthritis and Encephalitis (CAE) is a contagious virus among goats. It may affect a variety of body systems, one of these is the udder. Mastitis caused by CAE are often referred to as 'meaty udder'. These animal's udders will be firm with only mild swelling. They also usually have lowered milk production as the milk producing cells are effected. CAE is usually transmitted through colostrum although symptoms may not be seen for years. Therefore, offspring from a positive doe should be tested and sold if positive. On top of just a general suppression of the immune system it causes an 'aseptic' mastitis. Aseptic means that when milk is obtained and sent to a lab the lab will report no bacterial growth. Testing is done through a blood test. For other cases of mastitis, sending in a blood sample may be recommended as well.

Many farms have **Caseous Lymphadenitis (CL)**. The typical symptoms are abscesses around the head and neck areas. The infectious bacteria, Corynbacterium pseudotuberculosis, settles in the lymph nodes, both internal and external and causes abscesses within the lymph node. The udder also has lymph nodes. On some occasions abscesses will form in these lymph nodes, most often at the rear attachment of the udder. These abscesses in the other may be transmitted to the offspring nursing.

In rare occasions when a doe/ewe gives birth, she may have a calculus, a hard piece of minerals within the teat, obstructing the teat opening. If teat end is blocked, you may see the lambs/kids nursing frequently but the half of the udder still appears overly full. I recommend stripping out the teats after kidding/lambing. This is just one squirt of milk to make sure the teat canal is open and milk appears normal.

Since many different things may cause mastitis, the symptoms may vary greatly. Mild cases may be 'subclinical' or showing no symptoms except for a decrease in the amount of milk or decrease in the quality of milk produced. Mastitis that is clinical and showing changes and inflammation of the udder may be further classified as 'chronic' or 'acute'. Acute cases of mastitis usually develop suddenly with severe swelling, redness, and pain. Chronic forms of mastitis may still have inflammation but may just look like one half of the udder is larger than the udder. While chronic infections are not generally fatal to the animal, they can be a source for infecting other animals in the herd/flock.

Early signs of acute infections may begin as an asymmetrical udder, as well. As inflammation continues, udder becomes swollen and warm to the touch. The udder can feel hard or lumpy. Milk can appear normal or progress to flakes or clumps, or for some infections milk may be clear or yellow or no milk production at all. In very severe cases of mastitis, a gangrenous infection may set up that interrupts the blood supply causing the udder to feel cold and become blue/black as it rots, this leads to a common term of "blue bag". Many times the teat and surrounding areas have a distinct line of color change. This is very painful for the ewe/doe. Systemic symptoms or those involving the animal as a whole are fever, pain, decreased appetite, weakness or even death.

Treatment and overall prognosis will depend on the type of mastitis and the severity. For bacterial infections, intramammary infusions of antibiotics allow for us to get higher concentrations of the antibiotics directly into the udder and tissues that are affected. Intramammary antibiotics are sold in tubes with a blunt plastic tip that is inserted into the teat opening. Care should be taken when infusing, to be as clean as possible, which includes wiping the end of the teat with alcohol, to prevent introducing more bacteria into the udder. Several different antibiotics are sold as intramammary treatments. Each type of bacteria are more sensitive to certain antibiotics than others. "Dry cow" formulations are designed to be long acting while other formulations are labeled for lactating animals. Consult with your herd veterinarian for more specific recommendations based on diagnostic

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tests, including culture/sensitivity. In small ruminants, even after infections are cleared, it is not uncommon for the mastitis to return on the next lactation. When the ewe/doe is dried off or stops milking/nursing she should be treated again with a long acting infusion, 'Dry Cow' intramammary infusion.

Some cases of mastitis may result in life-threating systemic infections (involving the whole body). The increased amount of blood flow to the udder during lactation allows the infection to gain access to the blood stream and become a systemic infection. For these cases, injectable antibiotics should be used to treat the animal. As many of these are off label, discuss with your veterinarian for specific products and appropriate doses.

Lastly, as with any disease, supportive treatment should be administered. Supportive treatment may include anti inflammatories to decrease fever, pain and swelling. Animals that are not eating may need vitamins, electrolytes or fluids, these may be administered orally, by injection or intravenously. Other supportive treatments may be frequent milkings to try to get as much bacteria out of the udder as possible or warm compresses for the very swollen udders. While most producers will at some point have a case of mastitis, most cases can be prevented. As with all diseases and conditions, prevention is better and more economical than treating after there is an outbreak. The mainstays of preventative care, as with other diseases, are proper nutrition, sanitation, and biosecurity. For the environmental causes, obviously the more bacteria that is in the environment will increase the likelihood of infection. E. coli for example, is a bacteria most often associated with manure/feces. Does/Ewes that are in pens or pastures with excessive amounts of manure will be exposed more. Also, bedding that is wet will help spread the bacteria that is present across surfaces and teat ends. Keeping kidding/lambing pens as clean as possible and changing bedding regularly will go a long way in preventing environmental mastitis.

Conformation, (way the udder attached and teat size and shape) of the udder and teats also become very important. If the udder is very pendulous and has weak attachments it is more likely to get injured. Teat conformation includes length and size. Abnormalities such as 'fish teats' or double teats increase chances of mastitis as well. The more openings into the udder, the more potential routes of bacterial entry. Also, with fish teats or fused teats, the lambs/kids may not be able to nurse, causing a buildup of milk that can lead to mastitis..

The ends of the teats have a small sphincter. This sphincter should be tight as it serves as a protection for the udder against the outside environment. A doe/ewe that leaks milk may have a weak sphincter. If milk can easily leak out, then bacteria may more easily go into the udder. For dairy farms, sphincters that are too tight may be frustrating causing more time spent milking, although it is better for mastitis prevention.

For dairy producers, milking practices should ensure the best possible hygiene. This includes wearing gloves when milking, cleaning the teats thoroughly before milking. Using a quality post dip that contains an antibacterial component will help with prevention as well. Animals suspected of having mastitis should be tested with a California Mastitis Test, diagnostic lab culture of milk, and possibly a CAE blood test. Does with mastitis should always be milked last. This will decrease the likelihood of transmitting to the next animal in the milking line if it is a contagious type. Also, thorough cleaning and disinfecting of the milking equipment and milking parlor should always be performed after every milking.

California Mastitis Test is a kit that may be purchased through multiple sources. This kit contains a plastic paddle, where milk samples may be mixed with reagents and will detect the presence of somatic cells (cells from the body) within the milk. If an udder is infected, somatic cells or white blood cells are usually present in the milk and will react with the chemicals to make visible clumps. This test does not detect the type of bacteria present, but is a useful tool for early detection of subclinical infections.

If CAE is suspected, sending a blood sample for testing is recommended. As there is no treatment for this virus, any doe that tests positive should be culled or kept separate from the non-infected herd. If one animal is positive, testing the entire herd is recommended as animals that test positive for CAE are not always symptomatic. The highest risk of transmission of this virus is through colostrum to a does' offspring. Kids from does that are known to be positive should be fed an alternate colostrum/milk and tested after they are 6 months old.

California Mastitis Test Kit

Health of lambs/kids can also contribute to mastitis of the dam. As mentioned earlier, Mannheimia species are a common source of pneumonia. This bacteria may spread through saliva and set up severe infections in the mammary tissues. Preventing sore mouth within your herd will decrease the incidents of lesions on teats and decrease the secondary mastitis. For both of these pathogens, improving the health of the lambs/kids can improve the health of the dams.

Causes and symptoms of mastitis vary greatly. This may be a frustrating problem for small ruminant producers. While all instances of mastitis cannot be prevented, the number of cases and economic losses can be decreased. Improved sanitation, early detection, treatment, and improving herd health overall will help improve udder health on your farm.

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