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Bacterial Abortions of Sheep and Goats

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Abortions can cause serious economic losses to both sheep and goat producers in California and the United States. When an abortion occurs in your flock or herd it is very important to quickly identify the cause before your facility suffers severe losses. While finding a few animals aborting each year is not unusual, the finding of large numbers of animals aborting - sometimes referred to as an abortion "storm"- should be of concern. Abortion rates normally run less than 4%. Abortions rates greater than 10% should be considered an emergency and thoroughly investigated. Examination of the fetal and placental tissues by your veterinarian and your regional veterinary diagnostic laboratory will assist you in identifying the cause of the abortion.

Examination of the placenta for abnormalities is very important. Many bacterial abortions have placental damage followed by infection in the fetus. Placental damage involving both the cotyledons and intercotyledonary spaces (structures important for fetal and maternal blood contact) often suggests a bacterial agent. Consequently, it is very important that the placenta be submitted with the fetus for a complete pathological exam.

Although sheep and goats are two completely different species of animals, they both tend to be affected by similar bacterial agents that contribute significantly to abortions. The most common bacterial agents to cause abortions in small ruminants worldwide are *Chlamydomphila* (*Chlamydia*), *Campylobacter*, *Coxiella*, *Brucella*, and *Listeria*. Knowing how these bacterial agents infect your animals may assist

you in preventing serious economic losses in your herd or flock.

Chlamydomphila (*Chlamydia*) *abortus* is the cause of ovine enzootic abortions. This organism is a major bacterial agent responsible for abortions in both sheep and goats. Affected animals tend to abort during the last trimester of gestation (6 to 8 weeks prior to birth) or deliver stillborn or weak non-viable neonates (young lambs or kids). The affected doe or ewe rarely demonstrates any illness prior to the abortion. Does and ewes become infected by oral ingestion of the bacteria in contaminated feces or infected fetal (usually placental) tissues and fluids. Once ingested, the bacteria colonize the intestinal lining of the animal and spread systemically through the blood to the uterus and ultimately the placenta and fetus. The identification of this agent in fetal and placental tissues is accomplished by using special procedures involving fluorescent antibody and immunohistochemical techniques. Owners need to take care when handling fetal tissues since this agent can infect people and make some people sick.

Campylobacter (*Vibrio*) bacteria are a serious cause of abortion in sheep. Goats are more resistant to *Campylobacter* infections resulting in fewer abortions. Three species of *Campylobacter* tend to cause most infections: these organisms are *Campylobacter fetus*, *Campylobacter jejuni* and *Campylobacter lari*. *Campylobacter* infections most often cause late term abortions, stillbirths, or the birth of weak non-viable lambs.

Ewes rarely show clinical signs of being sick prior to aborting but some animals may have a vaginal discharge suggestive of a uterine infection after aborting. Occasionally these animals may die from complications due to the uterine infection. Susceptible animals become infected by oral ingestion of *Campylobacter* contaminated feces in feed or water. The bacteria first colonize the intestines of the pregnant adult animal. The bacteria then spread to the uterus and placenta via the blood stream causing an infection of the placenta and fetus. The diagnosis of a *Campylobacter* infection is completed by gross and microscopic examination of the placental and fetal tissues and bacterial isolation. Vaccines are available for use in flocks to prevent this disease. Unfortunately, once an outbreak has occurred, it is often too late to vaccinate since infected animals have already been shedding the bacteria in the feces for some time and most likely have infected many other herd members. Consequently, the herd must be vaccinated prior to exposure (before the next breeding season) to prevent infections and abortions.

Coxiella burnetii is a bacterial agent that can cause serious abortion storms in sheep and goats. **This agent also can infect many species of animals and is known to cause a serious disease in man called "Q" fever.** Abortions tend to occur in young animals that have not been exposed to the bacteria. Both aborting and non-aborting animals can shed the bacteria in feces for several days prior to aborting and for weeks after aborting. The organism can also be found in milk and uterine discharge. *Coxiella* infections often cause late term abortions (6 to 8 weeks prior to birth), stillbirths and the birth of weak non-viable neonates that only survive for several days. Infected females are rarely sick but some animals may develop a severe uterine infection lasting weeks to several months with organisms present in the uterine discharge. Young, pregnant, naïve (not previously exposed) animals become infected by oral ingestion of the bacteria. The licking of *Coxiella* contaminated uterine discharges and fetal fluids and the ingestion of contaminated feed and bedding are the common sources of infection. Like the other two previously discussed bacteria, placental infections lead to fetal infections and death. The placenta is critical for the identification of this organism and needs to be submitted with the fetus for examination since the bacteria cannot be cultured by standard routine culture techniques. It should be remembered that this organism can be shed in the milk of sheep and goats for a prolonged period of time. This makes it easy for people to become infected when drinking

unpasteurized milk products. In addition to the ingestion of milk, handling infected placental tissues can also cause people to become infected.

There are two principal species of *Brucella* that infect sheep and goats. These are *Brucella ovis* (infections in sheep) and *Brucella melitensis* (infections in sheep and goats). *Brucella ovis* tends to be a ram disease causing orchitis and epididymitis (swollen testicles). However, ewes can become infected resulting in early embryonic death of the fetus (less than 4 weeks after conception) and repeat breeding. *Brucella ovis* infections are routinely seen in the United States. *Brucella melitensis* infections are very rare in the United States; however infections tend to be a serious disease concern. Animals often become infected with this organism by the introduction of an infected animal into the naïve herd or flock. Infected carrier animals will shed the bacteria in the uterine discharge and placenta after parturition (giving birth). Other animals become infected by oral ingestion of uterine discharges and the placenta tissues or ingestion of contaminated feed and bedding. Infected animals develop a systemic (whole body) infection with the bacteria localizing in the placenta and infecting the fetus with a severe systemic disease and bacterial bronchopneumonia. Abortion storms tend to occur during the last trimester (6 weeks) of gestation. Stillbirths and the birth of weak non-viable neonates is also a common finding. Diagnosis of brucella infections is completed by isolation of the bacteria from placental and fetal tissues.

You must be very concerned about getting *Brucella melitensis* into your herd or flock because this is a serious disease that not only infects your animals but can also infect people. People infected with the bacteria often develop a serious chronic disease leading to many complications. If living in regions where this disease is endemic, it is important to ensure that infected animals are not introduced into the herd. Replacement animals should be purchased from **brucella** free regions. Special serologic tests (test done on blood samples) on new breeding stock can be completed prior to the introduction of the new animals into your flock or herd to ensure that the new animals are free of this disease.

Listeria infections in sheep and goats are caused by two organisms, *Listeria monocytogenes* and *Listeria ivanovii*. Infections by these bacteria tend to occur in temperate regions of the world and are often a problem usually between December and May.

The feeding of poor quality or spoiled silage (pH>5.0) is often the most common source of infections leading to abortion storms. However, range animals and animals fed hay have also been known to become infected. After ingestion of the bacteria, infection of the blood stream develops within 24 hours followed rapidly by invasion of the placenta and fetus. Infected fetuses are often aborted 7 to 10 days after infection. Affected does or ewes may develop a fever with depression prior to the abortion. Affected fetuses are usually mid to late gestation with most aborted fetuses around 12 weeks gestation. Stillbirths and the birth of weak non-viable neonates are common. Affected dams may develop a severe uterine infection for up to three weeks after the abortion with large numbers of the bacteria present in the uterine discharge. Like the other bacteria, placental and fetal examination, along with bacterial cultures and special diagnostic procedures, will aid in the identification of this organism.

Other bacteria are also known to cause abortions. However, most of these are considered to be individual animal problems and are often associated with a bacterial septicemia (a condition where many tissues or organs are affected by the infection) in the dam. The lesions seen in the fetus infected with these minor bacterial agents are often indistinguishable from those bacteria already discussed. These bacteria must be differentiated from each other by bacteriological cultures and special laboratory techniques that are usually performed by your regional veterinary diagnostic laboratory.

An abortion storm requires you to take important steps to control the problem. All dead fetuses and placental tissues should be removed immediately from the area and disposed in a manner that will preclude further contamination of the environment. Affected dams, along with animals that have a vaginal discharge, should be isolated from the remainder of the pregnant animals to prevent further exposure. No new animals should be placed in the affected area until all bedding is removed and the surfaces cleaned and disinfected. Pregnant animals should not be fed on the ground which can lead to feed becoming contaminated with infected fecal material, fetal fluids and fetal tissues. Water troughs should be cleaned daily to prevent fecal material contamination. In range herds or flocks, restricting infected animals from streams may be advisable particularly if other animals have access to this water downstream. New animals to be added to the herd or flock

should be quarantined for at least 14 days prior to introduction into the herd and checked regularly for signs of illness. All new animals should also be purchased from breeders with animals that have not experienced an abortion storm. If you live in an area where *brucella* is endemic, serology on newly purchased males and females should be completed to ensure that the animals are serologically negative for *brucella* prior to introduction into your herd or flock.

In order to prevent future abortion storms, the agent responsible must be identified. Both fetal and placental tissues should be submitted to your veterinarian or regional veterinary diagnostic laboratory for further diagnostic workup. If the bacterial agent is identified and a vaccine is available (*Chlamydomphila* and *Campylobacter*), one should plan on vaccinating the herd prior to the next breeding season.

Finally, **remember that most of the bacteria responsible for abortions in sheep and goats can also cause diseases in people.** When handling fetal and placental tissues and working with uterine discharges from either aborted animals or animals that have live, healthy offspring, always wear disposable gloves and wash hands to prevent possible exposure to these agents. Consuming raw (unpasteurized) milk is another way that people can become infected with these and other disease causing bacteria. Milk for home use should always be heat treated or pasteurized before drinking. Careful attention to hygiene and sanitation can reduce the risk of spreading bacterial diseases within your herd or flock, and also will decrease the danger of these bacteria infecting you, your employees or your family.

The California Animal Health and Food Safety Laboratory System serves the people of California by safeguarding the public health with rapid and reliable diagnoses for animal diseases affecting humans. CAHFS operates in partnership with CDFA, UC Davis, California veterinarians and livestock and poultry producers.

Following is contact information for the Tulare laboratory which would be the best choice for submitting sheep and goat samples from the Kings, Tulare, Fresno area:

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