

## CONTAGIOUS AGALACTIA OF SHEEP AND GOATS

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### Definition [top](#)

Contagious agalactia (CA) of sheep and goats is an infectious disease of males and females of these species characterized by fever, malaise, and septicemia followed by arthritis, keratoconjunctivitis, and in the females, mastitis and agalactia.

### Etiology [top](#)

The etiologic agent of the classical disease is *Mycoplasma agalactiae*, which, since its isolation in 1923, has been considered to be the main cause of the disease. However, it has become evident that the "contagious agalactia" syndrome (especially in goats) can also be caused by several other mycoplasmas, notably *M. capricolum capricolum* and *M. putrefasciens* (5), *M. mycoides capri* (10), and the

"large colony" or LC type of *M. mycoides mycoides* (1). Some have questioned limiting the term "contagious agalactia" to the disease caused by *M. agalactiae* (6). This discussion will focus on CA as caused by *M. agalactiae*.

Many of the routinely used disinfectants will effectively inactivate the organism. Effective disinfectants are sodium hypochlorite (30 ml of household bleach in 1 gallon of water), cresol, 2 percent sodium hydroxide (lye) (pH 12.4), formalin (1 percent), sodium carbonate (4 percent anhydrous or 10 percent crystalline with 1 percent detergent), and ionic and nonionic detergents.

### Host Range [top](#)

Goats seem to be more susceptible to the natural disease than are sheep, but *M. agalactiae* is an important pathogen of both species. Most outbreaks occur in the summer months and coincide with the time of births and peak lactation.

### Geographic Distribution [top](#)

Contagious agalactia is an important disease in the Mediterranean countries of Europe, Asia, and North Africa, in the former Soviet Union, in India and Pakistan, and in countries of the Near East. It has also been reported from Australia, South Africa, and South America. Although three isolations of *M. agalactiae* have been reported from the United States, it appears that North American strains are of low virulence and do not cause classical CA.

### Transmission [top](#)

The disease spreads by ingestion of feed, water, or milk contaminated with infected milk, urine, feces, or nasal and ocular discharges. Transmission may also be by direct entry to the teat opening at milking or by inhalation of contaminated dust. Animals with subclinical or chronic infections can carry and shed the mycoplasmas for months, and the organisms can survive in the supramammary lymph nodes from one lactation to the next. Contaminated fomites can transmit the organisms between premises. The disease appears to be less contagious than it was formerly thought to be (6).

### Incubation Period [top](#)

The incubation period in the natural disease varies between 7 and 56 days.

### Clinical Signs [top](#)

Infection with *M. agalactiae* occurs in male and female sheep and goats and can be inapparent or can cause mild, acute, or chronic disease. Freshening female goats at the beginning of lactation are especially susceptible and often display the acute form of the disease. After an incubation period of from 1 to 8 weeks, transient fever followed by malaise and inappetance are observed. This is followed by mastitis, polyarthritis, and keratoconjunctivitis.

The mastitis is characterized by a change in the color of the milk to greenish-yellow or grayish-blue, and in the texture of the milk to a watery and later lumpy consistency as lactation decreases and eventually ceases. The udder eventually becomes flabby, fibrosed, and atrophic.

The polyarthritis, first seen as swelling of the periarticular tissues, especially of the carpal and tarsal joints, later develops into painful chronic infection, resulting in lameness and inability to stand or walk. In male goats this may be the main manifestation of the disease.

The keratoconjunctivitis is usually of short duration and is seen in about 50 percent of infected animals. It may occasionally develop into a chronic infection, occasionally resulting in unilateral or bilateral blindness.

Abortion has been described in chronically infected animals, but its pathogenesis is not understood. *Mycoplasma agalactiae* has also been associated with granular vulvovaginitis in goats (13).

### Gross Lesions [top](#)

The principal lesion in female animals is catarrhal mastitis with primary inflammation of the interstitial tissues followed by secondary acinar involvement. If the mastitis becomes chronic, progressive fibrosis and eventually parenchymatous atrophy will be seen.

In males and females dying of the acute disease, congestion of the musculature and of the spleen and liver may be seen as a result of the septicemia. In both acute and more chronically affected animals, arthritis with periarticular edema is common and especially affects the carpal joints. Synovial membranes may be hyperemic, and joint cavities may be filled with turbid or hemorrhagic fluid. The early eye lesion is usually a serous and later a mucopurulent conjunctivitis followed by keratitis and occasionally corneal ulceration.

### Morbidity and Mortality [top](#)

The economic impact of the disease lies in its high morbidity and resultant loss of milk and meat production rather than in its mortality. The greatest number of cases develops during those periods when the young are being born and the dams are in full lactation. In most outbreaks of CA, the mortality is low, seldom exceeding 20 percent, but occasionally secondary bacterial pneumonia may cause a higher mortality.

## **Diagnosis** [top](#)

### **Field Diagnosis** [top](#)

The characteristic clinical signs of the disease, namely mastitis with loss of milk production, keratoconjunctivitis, and arthritis, all occurring at or soon after parturition, warrant a clinical diagnosis of contagious agalactia. Because there are several look-alike mycoplasmal and bacterial infections, laboratory confirmation of field diagnosis is essential.

### **Specimens for the Laboratory** [top](#)

From a live animal, milk, swabs from the eyes, joint fluid, blood, urine, and feces, all provide good samples for isolation attempts. From a dead animal that has had severe clinical disease, the best specimens to submit are blood, urine, and tissues from liver, spleen, and other organs, and joint fluid from those animals with arthritis. All samples should be collected aseptically and, if possible, placed in transport medium (heart infusion broth, 20 percent serum, 10 percent yeast extract, benzylpenicillin at 250 to 1000 IU/ml). Samples should be kept cool and shipped on wet ice as soon as possible. If transport to the laboratory is delayed (more than a few days), samples may be frozen (1). Blood should be collected for serum.

### **Laboratory Diagnosis** [top](#)

Diagnosis of CA must be confirmed by isolation and serological identification of the causative agent. Serology, (the complement fixation [CF] test, indirect hemagglutination test, enzyme-linked immunosorbent assay [ELISA][11]) for the detection of antibodies is useful on a herd basis after the presence of the disease has been confirmed by isolation of the organism.

### **Differential Diagnosis** [top](#)

As stated in the section on etiology, several other mycoplasmas (especially of

goats) can cause syndromes resembling contagious agalactia. Pneumonia, mastitis, and arthritis can also be caused by *Pasturella haemolytica*; mastitis can also be caused by streptococci, staphylococci, or other bacteria; and arthritis can also be caused by both caprine arthritis encephalitis virus and the bacteria *Erysipelothrix rhusiopathiae*.

### **Treatment** [top](#)

With early antibiotic (tetracyclines, tylosin, erythromycin, and tiamulin fumarate) treatment the prognosis is good, and only in those animals developing chronic arthritis or keratoconjunctivitis is recovery unlikely. Oxyteracycline does not prevent subsequent shedding of the organisms, and with the other drugs this still needs to be determined.

### **Vaccination** [top](#)

Both live and inactivated vaccines have been used in the prevention of CA. A live-attenuated vaccine for goats (7) and vaccine prepared from a naturally avirulent strain of mycoplasma are effective in goats. Formalin-inactivated aluminum hydroxide precipitated vaccines have been extensively used in Eastern Europe. Because there seems to be some strain variation, the use of autogenous vaccines incorporating local strains of mycoplasma is recommended. The efficacy of inactivated vaccines is low. Two concerns about the use of live vaccines are that the vaccine organism may be shed in the milk and that although the vaccines may prevent the development of clinical disease, they do not prevent infection and shedding of virulent organisms.

### **Control and Eradication** [top](#)

#### **Prevention** [top](#)

Because CA is a chronic disease that may exist subclinically in carrier animals, it is important to maintain sufficient regulatory restrictions to prevent its introduction in apparently healthy animals.

#### **Containment and Eradication** [top](#)

In endemic areas, normal sanitary precautions of separating affected animals from healthy animals, separating milking animals from younger animals, cleaning and disinfection of milking utensils, practicing good hygienic principles when milking, cleaning and disinfection of stalls, and eliminating litter will reduce the incidence of

disease in a flock. If possible, newborn animals should be removed from the dam immediately after birth and fed only pasteurized colostrum and then pasteurized milk.

Eradication can be accomplished by slaughter of all infected and contact flocks.

### Public Health [top](#)

There is no evidence that humans are susceptible to *M. agalactiae*.

### GUIDE TO THE LITERATURE [top](#)

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