### ENZOOTIC ABORTION OF EWES/OVINE ENZOOTIC ABORTION  
*Chlamyphila abortus*

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<th>Animal Group(s) Affected</th>
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<td>Sheep and goat; less commonly cattle, pigs, horses and deer.</td>
<td>Oral transmission. Organism shed in aborted fetuses, placenta, vaginal secretions (during estrus and up to 9 days prior to and weeks to months post abortion) and in infected semen. Birds, i.e. pigeons and sparrows, may be reservoirs.</td>
<td>Can see nonspecific malaise in pregnant animals. Late term abortions, stillbirths, and birth of weak offspring.</td>
<td>Can see high rate of abortion, &gt;30%, in naïve flock or yearly rates up to 5% in enzootic form. Abortion storms can be seen in intensively managed flocks.</td>
<td>Tetracycline or oxytetracycline. Supportive care for complications of infection such as retained placenta, metritis, pneumonia or keratoconjunctivitis.</td>
<td>Remove infected or contaminated materials. Keep feed sources free of fecal material. Separate first lambing ewes from rest of flock. Animals that abort develop natural immunity (~3 year duration). Vaccination.</td>
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**Fact Sheet compiled by:** Denise McAloose  
**Sheet completed on:** 13 January 2011; updated 26 March 2013  
**Fact Sheet Reviewed by:** Bonnie Raphael, Carlos Rodriguez  

### Susceptible animal groups: Sheep, goat  

### Causative organism: *Chlamyphila abortus* (previously *Chlamydia psittaci* serotype 1) is the causative Gram negative intracellular bacterium and has two genera and 9 species. Antigenic strains in sheep and goat appear to be related. Antigenic type 1 is implicated in abortion, stillbirth and the birth of weak offspring.  

### Zoonotic potential: Yes, and it can cause serious infection in pregnant women and lead to miscarriage. Pregnant women are discouraged from having contact with the flock during lambing/kidding season. In non-pregnant humans, infection can produce flu-like symptoms.  

### Distribution: World-wide distribution  

### Incubation period: Infection occurs through ingestion. Organisms colonize the intestinal tract, invade the bloodstream and subsequently infect the placenta and developing fetus. Incubation can be as short as 2 weeks, although typically proliferation of the organism occurs at about day 90 of gestation. Infection is latent in lambs and non-pregnant ewes and becomes activated at conception.  

### Clinical signs: Non-specific malaise in dam may be seen. Abortion, stillbirth or birth of weak offspring does occur. Final trimester abortions occur in ewes infected at 5-6 weeks gestation; abortion in the subsequent pregnancy occurs in ewes that were infected after this time. Abortion can occur at any time during gestation for goats. In both species, retained placenta can occur. The infection in rams may cause orchitis.  

### Post mortem, gross, or histologic findings:  
Gross: Placental tissues contain multifocal to coalescing areas of red discoloration and edema; tissues can have a leathery appearance. Changes are typically diffuse but more significant changes may be noted in the
cotyledonary than intercotyledonary areas. The aborted fetus is often well preserved although can be autolyzed; it may have multifocal areas of hemorrhage in muscle, lymphoid tissues and the subcutis and/or pinpoint yellow areas of discoloration on the surface of the liver.

Histology: Placental changes are characterized by fibrinoid vascular necrosis, thrombosis, and severe neutrophilic placentitis with superficial necrosis of the chorion. Trophoblasts often contain numerous intracytoplasmic organisms that distend the cells, are difficult to see with routine hematoxylin/eosin staining, and are positive with special staining using a modified Ziehl-Neelsen, Gimenez or Giemsa stain. Changes in the aborted fetus are few and characterized by foci of coagulative necrosis in the liver and spleen that may be associated with peripheral mononuclear cell inflammation. Mild subacute inflammation can also be seen in the lungs and mild meningoencephalitis has also been reported.

**Diagnosis:** History of abortion provides suspicion to perform testing.

**Serology:** Complement fixation tests can present some cross reactivity and doesn’t distinguish between vaccination and natural infection; so should be paired at 2-3 weeks apart. High and rising titers in ewes and fetal serum antibodies aid in diagnosis of disease

**Tissue sections:** Histology; electron microscopy

**Special staining:** Positive staining of organisms with modified Ziehl-Neelsen, Gimenez or Giemsa in cytologic preparations or placentitis (confirmed histologically) with intrallesional/intracellular positive organisms; alternatively can try to id organism on cytology of vaginal swab.

**Immunologic tests:** ELISA, IHC, FA

**Definitive diagnosis:** PCR and real-time PCR, PCR microarray hybridization, indirect inclusion fluorescent antibody test, immunohistochemical staining, tissue culture or egg inoculation

**Material required for laboratory analysis:**

**Placenta (preferred) or fetus:** Fresh tissue for cytologic preps; 10% neutral buffered formalin fixed paraffin embedded (FFPE) tissue for histology or immunohistochemical staining; fresh or FFPE for PCR; contact laboratory for tissue storage/fixation for fluorescent antibody test;

**Vaginal swab:** For cytology or culture

**Serum:** *C. abortus* antibodies are confirmatory in the fetus; paired titers used diagnostically in adults

**Relevant diagnostic laboratories:**

Any laboratory capable of bacteriologic culturing is capable of diagnosing *C. abortus*.

National Veterinary Services Laboratories (NVSL)
P.O. Box 844
1920 Dayton Ave
Ames, IA 50010
515-337-7514

**Treatment:** *C. abortus* is sensitive to tetracyclines although sensitivity testing on cultured organism may aid treatment strategy. In face of outbreak, recommendations include treating all pregnant females during final 4-6 weeks of gestation. For disease prevention, two week treatment with tetracycline in feed (400 to 500 mg/head/day) in fiber-producing animals or injection of long-acting oxytetracycline (20 mg/kg IM or SC) every 10-14 days or twice a week treatment in the last 4-6 weeks gestation in dairy herds has been reported; alternately, can treat with one injection of long-acting oxytetracycline 6 to 8 weeks prior to parturition and 3 weeks post parturition.

**Prevention and control:** As high numbers of organisms are shed in aborted or stillborn fetuses and in infected placental tissues or uterine discharge; and organisms remain viable for several days or longer in cold or freezing
temperatures, isolate aborting dams and separate first lambing ewes from rest of flock. Animals that abort develop natural immunity of ~3 year duration. Infected or contaminated materials should be removed and feed sources kept free of fecal material. Pest control should be practiced as transmission can occur via rodent and birds. Vaccination: Live and inactivated vaccines are available for use in areas where vaccination is permitted; vaccination reportedly can prevent abortion and reduce excretion; can assist in control but will not eradicate it.


**Prevention:** For importation for breeding: International veterinary certificate ensuring 1. animal has been housed for previous two years or since birth in facility with no EAE positive tests for previous two years 2. no clinical signs of EAE on day of shipment 3. was test negative for EAE within 30 days of shipment. For importation of semen: International veterinary certificate ensuring donor animals 1. are from facilities that have been EAE test negative for previous two years and have not been in contact with animals of lower health status and were test negative for EAE for 2-3 weeks post semen collection and 2. an aliquot of the semen for export was culture negative for C. abortus.

**Control:** Separate first lambing ewes from rest of flock. Segregate aborting animals from herd for minimum of 3 weeks, burn or bury aborted materials, disinfect the area. Prevent contamination of food and water. Control can also include culling of live kids born to infected dams. Ewes that abort develop natural immunity to infection after the first abortion (wanes after ~ 3 years). Vaccine is available and licensed in some countries. One recommendation is for IM or SC vaccination 8 weeks prior to breeding and once again 4 weeks later; though immunity is thought to be protective for 3 years, annual boosters prior to breeding season are suggested. Animals that abort develop natural immunity (~3 year duration). Note: Immune or vaccinated animals can shed organism.

**Suggested disinfectant for housing facilities:** Susceptible to disinfection with quaternary ammoniums.

**Notification:** Reportable to State and Federal agencies in United States and to OIE.

**Measures required under the Animal Disease Surveillance Plan:** None.

**Measures required for introducing animals to infected animal:** Not recommended.

**Conditions for restoring disease-free status after an outbreak:**

The following are requirements of the Terrestrial Animal Health Code (http://www.oie; Chapter 14):

1. Sheep flock or goat herd is under official veterinary surveillance.
2. No sheep or goats have shown clinical evidence of infection for past 2 years.
3. A statistically appropriate number of sheep, goats > 6 months of age were test negative for EAE within past 6 months.
4. All sheep, goats are permanently identified.
5. No sheep, goat additions since 30 days prior to test in #3 unless
   - EITHER the additions were isolated from other animals in flock/ herd in the flock/ herd of origin for a minimum of 30 days and then were test negative for EAE prior to entry in the new flock/ herd.
   - OR the animal originated from a flock/ herd of equal health status.

**Experts who may be consulted:**

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services, Emergency Management
4700 River Road, Unit 41
### References