Diagnostic Exercise

From The Davis-Thompson Foundation*

Case #: 89 Month: January Year: 2018

Answer Sheet

**Title:** Goat, fetus, abortion, placenta, *Toxoplasma gondii.*

**Contributors:** Rahul B. Dange, Anatomic Pathology Resident, Mark Anderson, DVM, PhD, DACVP, California Animal Health and Food Safety Laboratory System, School of Veterinary Medicine, UC Davis, 620 W Health Science Dr, Davis, CA.

**Morphologic diagnosis:** placenta: severe, multifocal, necrotizing, cotyledonary placentitis with intralesional protozoal zoites.

**Typical microscopic findings:** 3/3 placentas - Multifocal, random areas of cotyledonary necrosis; mild neutrophilic, histiocytic infiltration; mineralization in the cotyledons, among these foci, there were rare intracytoplasmic protozoal zoites.

**Impression smear**, among cellular debris, there are clusters of zoites, consistent with *Toxoplasma gondii* placentitis.
Placenta, Cotyledonary surface, segmental necrosis, H&E

Rare intracytoplasmic protozoal zoites (H&E, 40X)
Mild multifocal, non-suppurative encephalitis with focal necrosis and mineralization (1/3 fetuses, H&E).

Below, placenta: IHC for T. gondii reactivity
Discussion: This case presents an abortion outbreak caused by *Toxoplasma gondii* infection in a goat farm. The presumptive diagnosis was made based on the gross examination, cytology and histopathology that revealed random necrotizing placentitis with intralesional zoites. Confirmatory diagnosis was made using immunohistochemistry and antibody ELISA assay. Interestingly, H&E stained impression smears were effective in demonstrating intracytoplasmic and extracellular protozoal organisms.

*Toxoplasma gondii* is an obligate intracellular coccidian protozoa that can infect virtually all warm-blooded animals (including but not limited to livestock, birds, humans, and marine mammals) (1). Vertical transmission of *T. gondii* may occur by transplacental infection of the fetus, whereas horizontal infection may occur via ingestion of tissue cysts or sporulated oocysts (2). Cats are considered the definitive host for this protozoa. In cats, *T. gondii* undergoes both sexual as well as asexual life cycles, whereas in birds and mammals it undergoes only asexual life cycle (3). Goats are one of the most susceptible species to *T. gondii* infections and infection commonly occurs through contaminated food and water by sporulated oocytes from infected cat feces (4). Transmission to humans can occur via the consumption of contaminated goat milk or uncooked meat (5). Toxoplasmosis can cause fatal secondary infection in immunocompromised individuals, such as in patients with AIDS and organ transplants recipients (6).

Multiplication of *T. gondii* in the placentomes causes multifocal necrosis and inflammatory reactions, hypoxia and fetal death subsequently leading to abortion (7). The uncontrolled multiplication of the protozoa in the placenta and rarely in the fetus is probably due to local suppression of immune mechanisms in the placenta and immature fetal immune system (7,8). Moreover, *T. gondii* is capable of stimulating synthesis and release of prostaglandin F2 alpha (luteolytic action) in the placenta, leading to decreased progesterone level and subsequent abortion (9, 10). *T. gondii* can survive intracellularly by preventing the fusion of the lysosomal membrane with the membrane of the parasitophorous vacuole due to absence of host protein markers in the parasitophorous vacuole (11, 12).

Multifocal necrotizing placentitis in the cotyledons of the infected goats is the most common histologic finding followed by seldom evidence of non-suppurative encephalitis, myocarditis, interstitial nephritis, hepatitis and diffuse interstitial pneumonia in the aborted fetal lambs and kids (1).

A preliminary diagnosis of *T. gondii* abortion can be made by characteristic gross lesions, microscopic examination of protozoal zoites on the impression smear (Giemsa-stained) and H&E stained histologic sections of placenta and fetal tissues. A definitive diagnosis is obtained by using either immunohistochemistry, PCR, or isolation of the organisms from the placenta or aborted fetus (13). *Neospora caninum* infection is considered a primary differential diagnosis due to similar histopathological lesions. Other differential diagnoses include *Chlamydia abortus*.
(enzootic abortion), *Listeria monocytogenes* (Listeriosis), *Leptospira interrogans* (Leptospirosis), *Brucella melitensis* (Brucellosis), caprine herpesvirus 1, and *Coxiella burnetii* (Q fever) infections (14).

**References and Recommended literature:**

*The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation. These exercises are
contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website (http://www.cldavis.org/diagnostic_exercises.html).

**Associate Editor for this Diagnostic Exercise:** Patricia A. Pesavento  
**Editor-in-chief:** Vinicius Carreira