

Western Round Robin Slide Conference 2025

Oregon Veterinary Diagnostic Laboratory - Oregon State University

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Case 1: C241650013-1 2

A 1-year-old, Angus steer. Animals were purchased from a sale yard during a period of extreme heat (>105F); of 75 animals, 25 showed clinical signs (unspecified) and were given Draxxin (tulathromycin injection). This steer was euthanized three days after the onset of illness.

Gross Findings:

Per submission form:

- Heart had one large lesion along with numerous small abscesses
- Septic joints

Histology Findings:

Heart. The myocardium has a large, well-demarcated, focal area of acute coagulative necrosis characterized by cardiomyocytes that are hypereosinophilic, vacuolated and fragmented, hyalinized, and homogenous with frequent hypercontractility bands. Approximately 70% of the tissue is affected. Within this area of coagulation necrosis, there are numerous aggregates of degenerate neutrophils associated with areas of marked fiber fragmentation and loss. Interstitial and interfascicular spaces are expanded by edema, eosinophilic polymerized fibrin, plump fibroblasts and cellular debris. Most vessels are thrombosed with fibrin often extending into the surrounding perivascular space. There is a clear line of demarcation from the area of necrosis, that is marked by a mild fibroblastic proliferation. At the outer edge of this area of demarcation, cardiomyocytes are often vacuolated and fragmented. Multifocally, in the area of unaffected myocardium, there are small foci of acute coagulative necrosis and aggregates of degenerate neutrophils. Throughout the tissue, there are intracellular protozoal cysts, in cross-section and tangential section, approximately 25um long to 50um long, lined by a thin, hyalinized wall, and filled by innumerable crescent-shaped basophilic, bradyzoites.

Morphologic Diagnoses:

Heart:

1. Regionally extensive, severe, subacute necrosuppurative myocarditis with infarction
2. Multifocal, intrasarcoplasmic protozoal cysts

Diagnoses:

Bacterial myocarditis (presumed)

Ancillary tests:

Heart:

- Aerobic and anaerobic culture: no bacteria recovered
- Gram stain: negative
- Clostridial FA (*C. chauvoei*, *C. novyi*, *C. septicum*, *C. sordellii*): all negative

Joint Fluid:

- *Mycoplasma bovis* PCR: not detected

Etiology:

Bacterial (presumed) - Histophilosis

Write up:

The histological findings in this case are indicative of bacterial etiology, with the primary differential diagnosis being an infection caused by *Histophilus somni*. This Gram-negative coccobacillus is associated with a range of clinical manifestations in cattle, collectively referred to as Histophilosis or the Histophilus somni disease complex (HSDC) (1,2). *Histophilus somni* is a commensal organism found in the lower urogenital and upper respiratory tracts of ruminants and is frequently implicated in opportunistic infections, particularly in the context of Bovine Respiratory Disease Complex (BRDC) (1, 2). Moreover, it can act as a primary pathogen and was initially identified in 1956 as the causative agent of thrombotic meningoencephalitis (TME) in intensive production systems and feedlot cattle (1, 2).

Clinical manifestations of histophilosis may include necrotizing myocarditis, septicemia, and arthritis. Cardiac lesions typically present as discrete, smaller than 3 cm, and minimally exudative, with the left ventricle's papillary muscles being the most frequently affected (2, 3). In humans, the papillary muscles are notably susceptible to infarction, particularly those of the left ventricle (2). *Histophilus somni* is distinct among bovine bacterial pathogens due to its propensity to elicit thrombosis, which may explain its prevalence in the left ventricular papillary muscles (1).

Draxxin (tulathromycin) is a long-acting injectable antibiotic specifically designed to target bacteria associated with BRDC, including *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni*, and *Mycoplasma bovis* (4). Following treatment, negative culture results are commonly observed in affected animals (1).

Differential diagnoses for the observed lesion include *Clostridium chauvoei* myocarditis, other suppurative or necrotizing bacterial myocarditis (*Escherichia coli*, *Pseudomonas spp.*, *Streptococcus spp.*, and *Mycoplasma bovis*), embolic bacterial infections (such as *Trueperella pyogenes*, *Listeria monocytogenes*, *E. coli*, *Pseudomonas spp.*, or *Streptococcus spp.*), foot-and-mouth disease (noted in suckling calves), and leptospirosis (2, 3, 5, 6).

Resources:

1. Inzana, T. J. (2016). *Histophilus somni : biology, molecular basis of pathogenesis, and host immunity*. Springer. <https://doi.org/10.1007/978-3-319-29556-5>

2. Margineda, C. A., O'Toole, D., Prieto, M., Uzal, F. A., & Zielinski, G. C. (2019). Histophilus somni myocarditis and leptomeningitis in feedlot cattle: case report and occurrence in South America. *Journal of Veterinary Diagnostic Investigation : Official Publication of the American Association of Veterinary Laboratory Diagnosticians, Inc*, 31(6), 893. <https://doi.org/10.1177/1040638719876302>
3. O'Toole, D., Allen, T., Hunter, R., & Corbeil, L. B. (2009). Diagnostic exercise: Myocarditis due to Histophilus somni in feedlot and backgrounded cattle. *Veterinary Pathology*, 46(5), 1015–1017. https://doi.org/10.1354/VP.08-VP-0332-O-DEX/ASSET/IMAGES/LARGE/10.1354_VP.08-VP-0332-O-DEX-FIG5.JPEG
4. DRAXXIN - *Injectable cattle antimicrobial* | Zoetis US. (n.d.). Retrieved September 29, 2024, from <https://www.zoetisus.com/products/cattle/draxxin>
5. Deka, P., Das, S., Hazarika, R., Kayaga, R., Dutta, B., Deka, A., Barman, U., Ahmed, R., Islam, N., Sarma, M., Deka, I., Rout, M., Sharma, K., & Sharma, R. K. (2024). Foot-and-mouth disease-associated myocarditis is age dependent in suckling calves. *Scientific Reports 2024 14:1*, 14(1), 1–7. <https://doi.org/10.1038/s41598-024-59324-9>
6. Zechel, M., Franz, M., Baier, M., Hagel, S., & Schleenvoigt, B. T. (2021). Pericarditis as a cardiac manifestation of acute leptospirosis. *Infection*, 49(2), 349. <https://doi.org/10.1007/S15010-020-01496-3>

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