

# Theriogenology Question of the Month

This feature is sponsored by the American College of Theriogenologists. Readers of the *JAVMA* are invited to submit contributions. Contributions should provide a learning exercise about theriogenology. A specific question should be posed for the readers. The author's answer to the question and a brief discussion should be presented. Possible topics include commonly seen problems in domestic or exotic animals. Herd problems in dairy and beef cattle, sheep, goats, horses, and exotic hoofstock, problems in kennels or catteries, or flock problems in domestic and exotic fowl also are appropriate. Please contact Dr. Craig A. Smith, Associate Editor (800/248-2862, ext 259, or FAX 847/925-1329), for further details.

## History

A 5-year-old nulliparous 500-kg (1,100-lb) Thoroughbred mare was examined at 290 days of gestation because of premature mammary gland development. The mare had been examined by use of transrectal ultrasonography 14 and 30 days after ovulation and had been palpated per rectum 45 and 60 days after ovulation, and it was determined that she was pregnant with a single fetus. Transrectal ultrasonography also had been performed 62 days after ovulation; a male fetus was detected, and the pregnancy appeared to be progressing normally.

A complete physical examination was performed; results were unremarkable. The perineal area was examined but appeared normal. Using a speculum, vaginoscopic examination revealed the cervical plug was intact and the cervix was closed. Discharge was not evident in the vaginal vault. Per rectal palpation revealed the fetus was viable, although it responded slowly to ballottement. Transrectal ultrasonography with a 5-MHz linear-array transducer revealed the thickness of the combined uteroplacental structure was 8 mm. In addition, there was no evidence of placental separation, placental edema, or fluid in the vagina, and allantoic and amniotic fluids appeared normal. Transabdominal ultrasonography with a 3.5-MHz sector transducer revealed a single fetus with a fetal heart rate of 80 beats/min. However, at the most ventral portion of the uterus, thickening of the placenta was evident, as well as separation of the endometrium from the chorioallantois caused by flocculent material (Fig 1). On the basis of the mammary gland development and results of transabdominal ultrasonography, treatment consisting of administration of trimethoprim-sulfamethoxazole (30 mg/kg [13.6 mg/lb] of body weight, PO, q 12 h), flunixin meglumine (1.1 mg/kg [0.5 mg/lb], IM, q 12 h), altrenogest<sup>a</sup> (20 ml, PO, q 24 h), and pentoxifylline<sup>b</sup> (4,000 mg, PO, q 12 h) was initiated.

Two days later, the mare aborted. Gross examination of the fetus did not reveal substantial lesions. However, the chorionic surface of the placenta was covered with a thick tenacious brown exudate throughout an extensive but demarcated area in the region corresponding to the base of the uterine horns and cranial aspect of the uterine body (Fig 2). The por-



Figure 1—Transabdominal ultrasonographic view of the uteroplacental unit of a 5-year-old Thoroughbred mare obtained after premature mammary gland development at 290 days of gestation. Notice fluid and material separating the endometrium and chorioallantois in the ventral portion of the uterus.



Figure 2—Gross appearance of the placenta obtained after the mare in Figure 1 aborted. Copious thick tenacious brown exudate is evident on the chorionic surface lesions in the portion of the placenta that occupied the base of the uterine horns and the cranial aspect of the placenta that occupied the body of the uterus.

tion of the placenta adjacent to the cervix was examined, but lesions indicative of ascending placentitis were not observed. Diagnostic testing included routine virologic and serologic tests of samples obtained from the mare and fetus; bacterial culture of fetal organs, placenta, and a swab specimen obtained from the mare's uterus; and histologic examination of fetal and placental tissues.

Results of fluorescent antibody and serologic tests were negative for *Leptospira* spp, and fluorescent antibody tests for equine herpesvirus yielded negative results. Bacterial culture of fetal organs did not yield isolates, but bacterial culture of placental and uterine specimens yielded numerous colonies of a gram-positive branching bacillus organism. Histologic examination of the placenta revealed hyperplasia of the chorionic epithelium with heavy infiltration of neutrophils. Exudate and filamentous bacteria also were evident. Substantial changes were not seen in the fetal organs.

## Question

What is the most likely cause of the abortion in this mare? Please turn the page.

## Answer

Bacterial placentitis attributable to a gram-positive filamentous branching bacillus organism.

## Discussion

There are few reports of placentitis, despite the fact it is an important cause of abortion and stillbirth in horses.<sup>1</sup> The etiologic agent for placentitis is believed to vary with geographic location as well as hormonal status, conformation of the perineal area, and general health of the affected mare.

In 1 study in which investigators examined placentas during foaling seasons in Kentucky during 1988 and 1989,<sup>2</sup> the major pathogens associated with placentitis were (in decreasing order) *Streptococcus zooepidemicus*, *Leptospira* spp, *Escherichia coli*, a nocardioform actinomycete, fungi, *Pseudomonas aeruginosa*, *S equisimilis*, *Enterobacter agglomerans*, *Klebsiella pneumoniae*, and  $\alpha$ -hemolytic streptococci. At that time, *Leptospira* spp and the nocardioform actinomycete (a gram-positive branching filamentous bacillus) were important new bacteria associated with placentitis in mares.<sup>2</sup>

In mares, placentitis can be categorized into 3 forms. The most common is ascending placentitis in which bacteria gain access via the cervix and ascend toward the body of the placenta and placental horns. The second form is diffuse or multifocal placentitis resulting from hematogenous spread of the organisms. A third more recently recognized form of placentitis is characterized by focally extensive placentitis predominately evident in the aspect of the placenta occupying the base of the uterine horns or the cranial aspect of the placenta occupying the uterine body (Fig 3). In general, placentitis results in disruption of the utero-placental unit, causing placental insufficiency and fetal compromise. Additionally, the fetus can be directly affected as a result of infection with the organism, resulting in weakness or death.

The focally extensive form of placentitis was evident in the mare reported here. It has been referred to as nocardioform placentitis and is associated with infection by a group of unclassified gram-positive branching filamentous bacteria. In the experience of 2 of our authors (NMW, JMD), > 100 cases of this form of placentitis were diagnosed during the foaling season in Kentucky in 1998, which represented approximately 40% of all cases of placentitis. Diagnosis prior to an abortion is difficult, even when using transrectal ultrasonography, because of a lack of placental thickening in the cervical region. Transabdominal ultrasonography, although the most rewarding diagnostically, is not always possible or practical. After abortion, the uterus is a good site from which to obtain specimens for bacterial isolation. However, the bacteria typically grow slowly on blood agar; therefore, cultures should be incubated for  $\geq 48$  hours.

Pathogenesis for this condition is unknown. However, the typical location of the placental lesions (ie, base of the uterine horns or cranial aspect of the

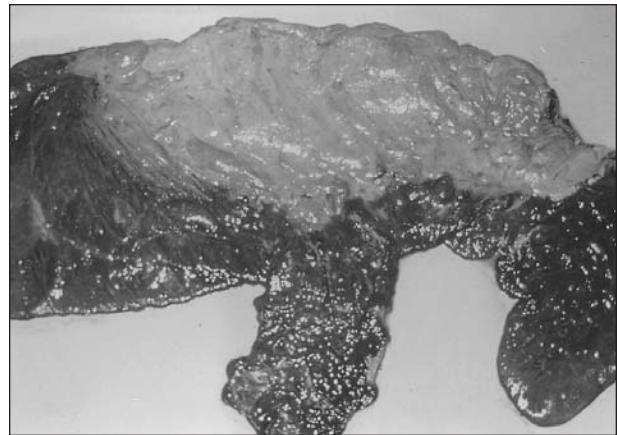


Figure 3—Placenta with lesions typical of nocardioform placentitis that results from infection with a gram-positive filamentous bacillus organism. Notice that the affected areas include the portions of the placenta that occupied the body of the uterus and base of the uterine horns, without evidence of ascending infection from the region of the cervix.

uterine body without apparent translocation from the cervical area) suggests that it is not an ascending infection acquired during gestation, nor is it consistent with a hematogenously derived infection.

The demarcated area of the involved placenta usually is covered with thick tenacious brown exudate. The underlying chorionic villi in the central portion of the lesion are typically necrotic with a chronic inflammatory response. At the periphery of the lesion, inflammation is more active and acute, and the chorionic villi are intact, although the epithelial cells have degenerative changes. The gram-positive filamentous branching bacteria often invade the superficial chorionic epithelium, but deeper chorionic structures are not invaded, and the bacteria are not typically cultured from fetal organs.

Finally, in the authors' experience, mares that abort as a result of infection with the gram-positive organism apparently do not have subsequent fertility or abortion problems. At this time, special management practices or changes cannot be recommended because of insufficient knowledge about the organism and pathogenesis of the placentitis.

<sup>a</sup>Regumate, Hoechst-Roussel, Agri-Vet Co, Somerville, NJ.

<sup>b</sup>Trental tablets, Hoechst-Roussel, Agri-Vet Co, Somerville, NJ.

## References

1. Swerczek TW. Equine fetal diseases. In: Morrow DA, ed. *Current therapy in theriogenology*. 2nd ed. Philadelphia: WB Saunders Co, 1986;699–704.
2. Hong CB, Donahue JM, Giles RC, et al. Etiology and pathology of equine placentitis. *J Vet Diagn Invest* 1993;5:56–63.

This report was submitted by Karen E. Wolfsdorf, DVM, DACT; Neil M. Williams, DVM, PhD, DACVP; and J. Michael Donahue, PhD; from Hagyard-Davidson-McGee, 4250 IronWorks Pike, Lexington, KY 40511 (Wolfsdorf); and University of Kentucky Livestock Disease Diagnostic Center, 1429 Newtown Pike, Lexington, KY 40511 (Williams, Donahue).