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Contagious Equine Metritis

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Overview

- Organism
- History
- Epidemiology
- Transmission
- Disease in Humans
- Disease in Animals
- Prevention and Control



In today's presentation we will cover information regarding contagious equine metritis and the organism that causes the disease. We will also talk about the history of contagious equine metritis, how the organism is transmitted, and clinical signs of disease. Finally, we will address prevention and control measures.

[Photo: Horses in a pasture. Source: Francois Marchal/Wikimedia Commons]

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THE ORGANISM

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The Organism

- *Taylorella equigenitalis*
 - Microaerophilic
 - Gram negative coccobacillus
- Two strains
 - Streptomycin sensitive
 - Streptomycin resistant



Contagious equine metritis is caused by *Taylorella equigenitalis*, a fastidious microaerophilic gram-negative coccobacillus. Infected horses do not become ill or die, but reproductive success is severely reduced. Only one serotype is known, but genetic differences between isolates have been described. Two types of strains exist, one sensitive and the other resistant to streptomycin. A small-colony variant, which appears to be less virulent, may be particularly difficult to identify: its only distinguishing characteristic in culture is that the colonies are small and transparent. [Photo: *Taylorella equigenitalis*. Source: <http://www.addl.purdue.edu/newsletters/2010/Winter/CEM.htm>]

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The Organism

- *Taylorella asinigenitalis*
 - Closely related to *T. equigenitalis*
 - Reported in:
 - Donkeys (U.S.)
 - Stallion (Europe)
 - Does cause significant disease
 - Must be distinguished from *T. equigenitalis* given the severe impact of CEM on international trade

A closely related organism called *Taylorella asinigenitalis* has been isolated from donkeys in the U.S. and a stallion in Europe. Although *T. asinigenitalis* does not appear to cause significant disease, its pathogenicity has not been fully determined. Given the severe impact of contagious equine metritis on international trade, infections with *T. asinigenitalis* must be distinguished from *T. equigenitalis*.


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HISTORY

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History

- First diagnosed in England, 1977
- First detected in U.S.
 - Kentucky, 1978
 - Thoroughbred farm
- Second U.S. outbreak
 - Missouri, 1979
- Third U.S. outbreak
 - Imported Lipizzaner stallions, 2006



CEM was first diagnosed in England in 1977. The first cases of CEM in the U.S. were diagnosed in 1978, on thoroughbred farms in central Kentucky. In April of the following year, an outbreak occurred in Missouri. The disease was rapidly eradicated from both States at that time. In 2006 three Lipizzaner stallions imported into the United States from Eastern Europe tested positive for CEM; however, the outbreak was believed to be limited to these three animals. Source: http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_ahcem.pdf. Photo: Horse. Source: www.public-domain-image.com]

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History

- Disease re-emergence in U.S.
 - December 2008
 - Index case: stallion in Kentucky
- Epidemiologic investigation
 - Five mares, 23 stallions tested positive
 - Additional 977 horses exposed
 - Multiple states affected
 - Suspected source
 - Stallion imported from Denmark in 2000

CEM has recently re-emerged in the U.S. In 2008, a Quarter Horse stallion in Kentucky tested positive for CEM. An epidemiologic investigation identified 28 positive cases (5 mares, 23 stallions), and an additional 977 horses that were exposed. Multiple states were affected. Final analysis of all the epidemiologic and diagnostic findings from the investigation indicated that a stallion imported from Denmark in late 2000 was the likely source of the outbreak. Source: [USDA APHIS VS. http://www.aphis.usda.gov/newsroom/hot_issues/cem/cem_cases.shtml#december](http://www.aphis.usda.gov/newsroom/hot_issues/cem/cem_cases.shtml#december).

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History

- Continued sporadic cases in U.S.
 - California, 2010
 - Arizona, 2011
- Cases unrelated to each other and to the 2008-09 CEM outbreak
- Exposed horses
 - Located, tested, treated

Since 2008-2009, only sporadic cases of CEM have been identified. These include an Arabian stallion in California (2010) and an Arabian stallion in Arizona (2011). These cases were both unrelated to each other and to the 2008 outbreak. When a CEM case is located, exposed horses are located, tested, and treated.

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EPIDEMIOLOGY

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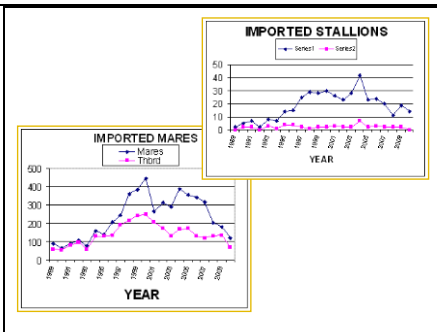
Epidemiology

- Reported mainly in Europe
 - Difficult to grow in culture
 - Geographic distribution difficult to estimate accurately
- Many countries have strict import regulations
 - Imported animals or semen may cause outbreaks in CEM-free regions


Taylorella equigenitalis has been reported mainly in Europe; however, this organism is difficult to grow in culture, and its geographic distribution is difficult to estimate accurately. Many countries have introduced strict import regulations to prevent its introduction. Imported animals or semen can cause outbreaks in CEM-free regions; for example, the 2008 U.S. outbreak occurred after an absence of more than 25 years.

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These graphs from the Kentucky Department of Agriculture show the number of mares and stallions imported from CEM-affected countries into Kentucky from 1987 to 2010. Imported horses are quarantined and undergo a series of tests and treatments to determine that the animal is not infected with CEM. The number of horses imported per year is variable; the lowest was 69 (in 1990) and the highest was 474 (in 2000). Images: <http://www.kyagr.com/statevet/equine/metritis2.htm>.

<p>S l i d e 1 3</p>	<p style="text-align: center;">TRANSMISSION</p>	
<p>S l i d e 1 4</p>	<p style="text-align: center;">Transmission</p> <ul style="list-style-type: none"> • Venereal transmission <ul style="list-style-type: none"> - Mainly during mating - Also spread by infected semen during artificial insemination or through fomites • Transmission rate high • Stallions are most common source <ul style="list-style-type: none"> - Bacteria persist months to years in reproductive tract 	<p><i>T. equigenitalis</i> is transmitted mainly during mating. It can also be spread by infected semen during artificial insemination or introduced to the genital tract on fomites. The transmission rate is extremely high. Stallions are the most common source of the infection. In untreated stallions, <i>T. equigenitalis</i> can persist for months or years on the reproductive tract, particularly in the urethral fossa and its associated sinus. This organism also occurs in the distal urethra as well as on the exterior of the penis and prepuce, and occasionally in the pre-ejaculatory fluid.</p>
<p>S l i d e 1 5</p>	<p style="text-align: center;">Transmission</p> <ul style="list-style-type: none"> • Asymptomatic carriage <ul style="list-style-type: none"> - Mares may carry on clitoris and in uterus - Foals born to infected mares can carry the bacteria on their external genitalia - Become long-term asymptomatic carriers 	<p>Mares can carry <i>T. equigenitalis</i> asymptotically after they recovery from acute disease. The vast majority of carrier mares maintain this organism on the clitoris, particularly in the clitoral sinuses and fossa, but a few carry it in the uterus. Foals (especially colts) born to infected mares can carry bacteria on the external genitalia and may become long-term asymptomatic carriers.</p> <p>[Photo: Thoroughbred mare and foal. Source: Wikimedia Commons at http://commons.wikimedia.org/wiki/File:Thoroughbred_Mare_%26_Foal_KY.jpg]</p>
<p>S l i d e 1 6</p>	<p style="text-align: center;">DISEASE IN HUMANS</p> <p>There is no evidence that <i>Taylorella equigenitalis</i> infects humans.</p>	<p>There is no evidence that <i>Taylorella equigenitalis</i> infects humans.</p>

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Species Affected

- Horses are only natural host
 - Thoroughbreds very susceptible
- Experimental infection
 - Donkeys
 - Rodents
- Incubation period
 - 2 to 14 days




Horses appear to be the only natural hosts for *T. equigenitalis*. Thoroughbreds seem to be particularly susceptible. Donkeys have been infected under experimental conditions. Attempts to infect cattle, pigs, sheep and cats have been unsuccessful, but some laboratory rodents can be infected by intrauterine inoculation. The incubation period is 2 to 14 days; most infections become apparent 10 to 14 days after breeding. [Photo: Horses grazing in pasture. Source: Wikimedia Commons]

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Disease in Animals

- Infected stallions
 - No clinical signs
- Infected mares
 - Metritis
 - Temporary infertility
 - Some infections subclinical
 - Mucopurulent vaginal discharge 1 to 2 weeks after breeding



Infected stallions display no clinical signs. Mares develop metritis and temporary infertility, although they have no systemic signs. Some infections are subclinical; the only sign may be a return to estrus after a shortened estrus cycle. Other mares also develop a mucopurulent vaginal discharge a week or two after breeding; in severe cases, the discharge is copious. Photo shows mucopurulent exudate draining from an equine vulva.


[Photo: Mucopurulent exudate drains from the vulva of a horse. Source: Plum Island Animal Disease Center/CFSPH]

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Disease in Animals

- Endometritis, cervicitis, vaginitis
 - Discharge resolves in days to weeks
 - Most infected mares do not conceive
 - Mares that give birth may transmit to foals
- Abortion



Variable degrees of endometritis, cervicitis and vaginitis can sometimes be found if the reproductive tract is examined, using a speculum. The discharge often disappears after a few days to two weeks. Most infected mares do not conceive. Those that do may give birth to a normal full-term foal that can carry the organism asymptotically. Abortions also occur, but appear to be uncommon. Photo shows mucopurulent exudate in the uterine body of a horse.

[Photo: The uterus of this horse contains mucopurulent exudate. Source: Plum Island Animal Disease Center/CFSPH]

<p>S I d e 2 1</p>	<p style="text-align: center;">Post Mortem Lesions</p> <ul style="list-style-type: none"> • Uterus <ul style="list-style-type: none"> - Severe lesions possible - Endometrial folds <ul style="list-style-type: none"> • Swollen, edematous, exudates present • Cervix • Salpingitis, vaginitis • Lesions most apparent 14 days post-infection then gradually decrease 	<p>The most severe lesions are usually found in the uterus. The endometrial folds may be swollen and edematous, and a mucopurulent exudate may be apparent. Edema, hyperemia and a mucopurulent exudate may be seen on the cervix. Salpingitis and vaginitis also occur. The lesions are most apparent approximately 14 days after infection, then gradually decrease in severity over the next few weeks.</p>
<p>S I d e 2 2</p>	<p style="text-align: center;">Morbidity and Mortality</p> <ul style="list-style-type: none"> • No fatal infections known • Morbidity very high <ul style="list-style-type: none"> - Nearly every mare mated to an infected stallion will become infected - Most mares recover <ul style="list-style-type: none"> • Some become asymptomatic carriers - Mares can be re-infected <ul style="list-style-type: none"> • Clinical signs most severe during first infection 	<p>Fatal infections have not been seen. Morbidity is high; nearly every mare mated to an infected stallion will become infected. Most mares recover without incident, but some become asymptomatic carriers. Immunity after an infection is not complete, and mares can be infected repeatedly during a short period of time. The first infection is usually the most severe; infertility and clinical signs are less likely to occur during later bouts of the disease, and some mares conceive.</p>
<p>S I d e 2 3</p>	<p style="text-align: center;">Diagnosis in Horses</p> <ul style="list-style-type: none"> • Clinical <ul style="list-style-type: none"> - CME should be considered in mares that develop abundant mucopurulent vaginal discharge 14 days after breeding • Differentials <ul style="list-style-type: none"> - <i>Pseudomonas aeruginosa</i> - <i>Streptococcus zooepidemicus</i> - <i>Klebsiella pneumoniae</i> 	<p>Contagious equine metritis should be a consideration in mares that develop an abundant mucopurulent vaginal discharge two to 14 days after breeding. The disease may also be suspected in mares that return prematurely to estrus, particularly when several mares have the same symptoms after being mated to the same stallion. <i>Pseudomonas aeruginosa</i>, <i>Streptococcus zooepidemicus</i> and some capsule types of <i>Klebsiella pneumoniae</i> can also cause outbreaks of endometritis. In general, most bacterial infections are not as contagious as contagious equine metritis and produce a scantier discharge.</p>
<p>S I d e 2 4</p>	<p style="text-align: center;">Diagnosis in Horses</p> <ul style="list-style-type: none"> • Culture <ul style="list-style-type: none"> - Genital tract swabs <ul style="list-style-type: none"> • May breed carrier stallions to test mares and culture mares for <i>T. equigenitalis</i> - Organism is fastidious • PCR <ul style="list-style-type: none"> - Infected and carrier mares and stallions • Serology 	<p>Definitive diagnosis is by isolation of the causative organism from swabs of the genital tract, or by polymerase chain reaction (PCR) assays. Culture should be performed by a laboratory experienced in isolating <i>T. equigenitalis</i>; this organism is fastidious and difficult to grow. Because carrier stallions can have few organisms, cultures from these animals may be unsuccessful. For this reason, stallions may be bred to test mares and the test mares cultured for <i>T. equigenitalis</i>. PCR assays can also be used to identify acutely infected mares or carrier mares and stallions. PCR can distinguish <i>T. equigenitalis</i> from <i>T. asinigenitalis</i>. Serology is unreliable as a diagnostic tool, but it may be helpful as an adjunct screening test. [Photo: Cotton sampling swab. Source: Danelle Bickett-Weddle/CFSPH]</p>

S I d e 2 5	<h3 style="text-align: center; margin: 0;">Sampling</h3> <ul style="list-style-type: none"> • Before collecting or sending any samples, the proper authorities should be contacted • Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease <small style="text-align: right; color: white;">Center for Food Security and Public Health, Iowa State University, 2012</small>	<p>Before collecting or sending any samples from animals with a suspected foreign animal disease, the proper authorities should be contacted. Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease.</p>
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S I d e 2 6	<h3 style="text-align: center; margin: 0;">Samples to Collect</h3> <ul style="list-style-type: none"> • Mares <ul style="list-style-type: none"> - Vaginal discharge - Clitoral fossa, cervix, endometrium • Stallions <ul style="list-style-type: none"> - Urethral fossa and sinus, distal urethra, external surface of penis and prepuce • Foals <ul style="list-style-type: none"> - Placenta and genital tract of normal foals born to infected mares 	<p>In infected mares, <i>T. equigenitalis</i> can be isolated from vaginal discharges. In mares suspected to be carriers, swabs should be taken from the clitoral fossa and its sinuses, and the cervix and endometrium. Only the clitoral sinuses and fossa are swabbed in pregnant mares. In stallions, swabs should be taken from the urethral fossa and sinus, distal urethra, and external surface of the penis and the prepuce. The pre-ejaculatory fluid may also be sampled. Bacteria can also be found in the placenta of some mares that conceived, and on the genital tract of some normal foals born to these mares. This organism has been detected at multiple sites in aborted fetuses.</p>
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S I d e 2 7	<h2 style="margin: 0;">PREVENTION AND CONTROL</h2>	
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S I d e 2 8	<h3 style="text-align: center; margin: 0;">Recommended Actions</h3> <ul style="list-style-type: none"> • IMMEDIATELY notify authorities • Federal <ul style="list-style-type: none"> - Area Veterinarian in Charge (AVIC) www.aphis.usda.gov/animal_health/area_offices/ • State <ul style="list-style-type: none"> - State veterinarian www.usaha.org/stateanimalhelathofficials.aspx • Quarantine 	<p>If you suspect contagious equine metritis, state or federal authorities should be notified immediately. Animals suspected with CEM should be isolated, and the farm should be quarantined until definitive diagnosis is determined.</p>
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Prevention and Control

- CEM screening before importation
- Endemic areas
 - Breed only CEM-free stallions and mares
 - High risk stallions
 - Bred for first time
 - High risk mares
 - Visited infected facility
 - Come from areas that are not CEM-free
 - Mated with stallion from non-CEM-free area



In countries free from contagious equine metritis, horses are screened for *T. equigenitalis* during importation. Where this disease is present, it is controlled by breeding only from stallions and mares that have been tested for the organism and are known not to be carriers. High risk stallions include those animals being bred for the first time. Mares that have visited an infected facility, come from an area that is not CEM-free, or have been mated with a stallion from a country that is not CEM-free are also likely to be infected. Mares with clinical signs, including those that return to estrus prematurely, should be investigated. [Photo: Horses in field. Source: U.S. Department of Agriculture]

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Prevention and Control

- Good hygiene, decontamination, and sanitation during breeding are important
- Cleaning and disinfection
 - *T. equigenitalis* susceptible to most common disinfectants
 - Chlorhexidine, ionic and non-ionic detergents, sodium hypochlorite
- No vaccine available

Good hygiene, decontamination of potential fomites, and sanitation during breeding are also important. *T. equigenitalis* is susceptible to most common disinfectants, including chlorhexidine, ionic and nonionic detergents, and sodium hypochlorite (400 parts per million). There is no vaccine.

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Prevention and Control

- Treatment of carriers
 - Wash external genitalia with disinfectant
 - Local antibiotic treatment
 - Systemic antibiotics recommended in some animals
- *T. equigenitalis* may be more readily eliminated in stallions

In carriers, *T. equigenitalis* may be cleared by washing the external genitalia with disinfectants (e.g. chlorhexidine), combined with local antibiotic treatment such as nitrofurazone ointment. Systemic antibiotics are also recommended in some animals. *T. equigenitalis* may be more readily eliminated from stallions, but treatment can take up to several weeks in mares.

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Prevention and Control

- Eradication
 - Surveillance
 - Testing
 - All stallions at beginning of breeding season
 - Mares tested according to risk of infection
 - Quarantine of infected animals
 - Treatment
 - Moratorium on breeding from infected animals



T. equigenitalis has been eradicated from some countries by surveillance/ testing, quarantine of infected animals, treatment and a moratorium on breeding from infected animals. Samples are generally taken from all stallions at the beginning of the breeding season, and from mares according to the risk that they carry this organism. The fastidious nature of the organism complicates its detection. PCR has been useful in eradication programs in Japan.

[Photo: Horse head. Source: Wikimedia Commons]

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Additional Resources

- Center for Food Security and Public Health
– www.cfsph.iastate.edu
- USAHA Foreign Animal Diseases
("The Gray Book")
– www.aphis.usda.gov/emergency_response/downloads/nahems/fad.pdf

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Authors: Ariel Pleva, MPH; Kerry Leedom Larson, DVM, MPH, PhD, DACVPM
Anna Rovisi Spickler, DVM, PhD
Reviewers: Glenda Dvorak, DVM, MPH, DACVPM

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