Contagious Equine Metritis Eradicated from Japan

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ABSTRACT. Contagious equine metritis (CEM), a contagious venereal disease of horses, invaded Japan in 1980 and spread in the Thoroughbred population of the Hidaka-Iburi district of Hokkaido. To eradicate CEM, we ran a program aimed at detecting Taylorella equigenitalis, the causal agent, in carrier horses by using the PCR test, followed by culling or treatment. In 2001, the first year of the program, 12,356 Thoroughbred racing stallions and mares were tested and 11 carriers were found. Four, two, one, and one carrier mares were detected in 2002, 2003, 2004, and 2005, respectively, by application of the program at the same scale as in 2001. No PCR-positive horses were found from 2006 to 2010. These results strongly suggest that CEM was eradicated from Japan by 2010.

KEY WORDS: CEM, eradication, PCR, *Taylorella equigenitalis.*


Contagious equine metritis (CEM) is a highly contagious venereal disease of horses that is caused by *Taylorella equigenitalis.* The causative bacterium is a persistent inhabitant of the smegma on the penis or clitoris in horses, and it invades the uterus at the time of copulation. Mares infected with this bacterium develop endometritis and short-term infertility, and the disease is spread rapidly by mating. CEM therefore severely affects horse-breeding operations. Since the first outbreaks were reported in England and Ireland in 1977 [5, 15], CEM has spread throughout the world, including to some European countries, Australia, and the United States of America [12, 14].

In May 1980, the first outbreak of CEM was confirmed in the Hidaka-Iburi district of Hokkaido, which is a major Japanese area for the breeding of Thoroughbreds for racing [7, 8, 13]. *Taylorella equigenitalis* (formerly called *Haemophilus equigenitalis*) was isolated from cervical swab specimens collected from mares with clinical signs of endometritis. By the end of the same year, 321 mares and stallions had been diagnosed with CEM by bacterial isolation testing.

Since then, bacterial isolation tests have been conducted on all breeding Thoroughbreds before the breeding season every year, and surveillance by isolation testing combined with serological testing using a passive hemagglutination test [6] is conducted during the breeding season. On the basis of these tests, the movement and mating of positive horses have been limited.

By 1997, as a result of these preventive measures, the number of horses from which *T. equigenitalis* had been isolated had decreased. Although eradication had not yet been achieved, CEM had become virtually confined to the Thoroughbred population of the Hidaka-Iburi district. The addition of CEM in 1998 to the list of diseases notifiable by law clearly demonstrated the continuing lack of spread of CEM beyond the Hidaka-Iburi district, and it enabled the number of infected horses in Japan to be determined officially (Table 1).

The results of molecular epidemiologic studies suggest that although *T. equigenitalis* invaded Japan on one occasion in or before 1980, the bacterium has not invaded since then. From 1980 to 1996, Matsuda and Miyazawa performed crossed-field gel electrophoresis of restricted genomic DNAs, after separate digestion with *ApaI* and *NotI,* against 130 isolates of *T. equigenitalis* from Thoroughbred mares and stallions in Japan. They reported that only a single genotype was present among all of the isolates [9, 10].

The above findings suggest that eradication of CEM would be achievable if thorough testing and selection were performed, using a highly sensitive method that could detect asymptomatic carriers, in Thoroughbreds destined for breeding.

In 1999, we developed a PCR method for direct rapid detection of *T. equigenitalis* in clinical specimens and reported its specificity and sensitivity as a diagnostic test for CEM [1, 2]. PCR testing has five times the sensitivity of bacterial isolation testing in detecting carrier horses. We proved that this PCR test was effective in revealing carriers in field; this suggested that eradication of CEM would be achievable by continued field application of the test [4].

The purpose of this paper is to report the results of a program aimed at eradicating CEM from Japan by using this diagnostic PCR test.
The eradication program was designed to operate by detecting *T. equigenitalis* in carrier mares and stallions by using the PCR test, followed by culling or treatment. In accordance with epidemiological data obtained up until the year the program started, we applied the program at all Thoroughbred racing breeding farms and studs in Japan. All horses, including teasers and other horses, bred on these farms and studs were tested by PCR before the breeding season every year, and a health certificate was issued if the result was negative. When the result was positive, the horse owner had to choose between culling and treatment.

Treatment was performed according to a proven method described previously [3]. Briefly, in stallions the penis was coated with gentamicin ointment after the removal of smegma by using a disinfectant solution. In mares, the uterus was treated first by using gentamicin solution, except if the mares were pregnant. In both pregnant and non-pregnant mares the clitoris was treated with disinfectant solution and gentamicin ointment. Additionally, clitoral sinusectomy was performed whenever possible in mares after treatment with disinfectant and antibiotics. After treatment for 5 consecutive days, each horse was checked by PCR testing three times.

Horses were issued with a health certificate and allowed to mate only if all results were negative. Treated horses were regarded as high-risk horses for 3 years, during which time all high-risk horses had to be checked 3 times by PCR after treatment with disinfectant solution and gentamicin ointment. All horses, including teasers and other horses, bred on these farms and studs were tested by PCR before the breeding season every year, and a health certificate was issued if the result was negative. When the result was positive, the horse owner had to choose between culling and treatment.

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<td>Hidaka-Iburu district of Hokkaido Total</td>
<td>321</td>
<td>57</td>
<td>35</td>
<td>25</td>
<td>33</td>
<td>212</td>
<td>100</td>
<td>96</td>
<td>96</td>
<td>70</td>
<td>24</td>
<td>33</td>
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<td>1</td>
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After 1998, the numbers of CEM cases were reported officially because the disease became notifiable.
One positive mare was detected and culled in 2004, and one in 2005. Among the total of 19 horses found to be PCR positive in the period 2001 to 2010, one stallion was treated, five mares were culled, and 11 of 13 treated mares underwent clitoral sinus removal. No samples taken from the 14 treated high-risk horses in a 3-year period after treatment were PCR positive. In the 5 years from 2006 to 2010, no PCR positive horses were found, even though the PCR tests were performed on the same scale as in previous years.

An epidemiological survey of the 10 mares and one stallion that tested PCR positive in 2001 revealed that four of the mares had been mated with the PCR-positive stallion and five of the mares had been mated with two stallions standing at the same stud. These epidemiological data suggest that the small outbreaks occurring that year were associated with these stallions. Furthermore, three of the four mares found to be PCR positive in 2002 and both mares found to be PCR positive in 2003 were epidemiologically related to the horses that were PCR positive in 2001. In contrast, each of the mares found to be PCR positive in 2004 and 2005 had no epidemiological relationship to any of the horses diagnosed as PCR positive before, and no PCR-positive horses were found in the following 5 years. These findings suggested that the CEM was confined effectively and that the presence of carriers gradually but definitely disappeared as a result of the program.

With two exceptions, CEM infection of Thoroughbreds has been recognized in the Hidaka-Iburu district only. In Chiba Prefecture in 1981, bacteria were isolated from a Thoroughbred mare that had been moved from a farm in Hokkaido in 1980 when the first outbreak of CEM was found [16]. From November 1991 through to March 1992, *T. equigenitalis* was also isolated from three Thoroughbred mares that had been moved to Aomori from Hokkaido after being mated with a PCR-positive stallion. In these two instances there was no further infection, and on further testing both areas have since remained free from CEM.

Cases of infection in non-Thoroughbreds have also been limited. Only one instance, in 17 Japanese native ponies, has been confirmed, at Hidaka in Hokkaido, in 1987. Because these horses had no direct contact with Thoroughbreds, indirect transmission via a person or equipment was suspected. Since these ponies were treated, there have been no other positive cases in non-Thoroughbreds.

This epidemiological background suggests that expansion of the distribution of CEM in Japan was virtually limited to the Thoroughbred population of the Hidaka-Iburu district in Hokkaido, and that the program effectively eradicated CEM from Japan.

In conclusion, these findings strongly suggest that eradication of CEM was finally achieved by 2010. CEM carriers were removed year by year as the program progressed, and no PCR-positive horses were found in the last 5 years.

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REFERENCES


