

Malignant Catarrhal Fever in Bison

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Q. What is malignant catarrhal fever?

A. Malignant catarrhal fever - MCF for short - is a generally fatal disease of cattle, bison, true buffalo species, and deer. It is caused by viruses belonging to the Herpesvirus family. MCF occurs worldwide and is endemic in the United States and Canada. MCF in bison is caused by a virus called ovine herpesvirus-2 (OHV-2). A closely related virus called Alcelaphine herpesvirus-1 (AHV-1) is responsible for most cases of MCF in Africa.

Q. Why are there so many unanswered questions about MCF?

A. The virus responsible for the sheep-associated form has never been isolated. Until recently, this made it difficult to develop reliable laboratory tests. The sporadic nature of the disease and relatively low losses attributed to MCF in cattle made it a low priority for research funding agencies.

Q. How long has MCF been in North America?

A. Reports of an MCF-like disease in cattle in North America appeared as early as the 1920s. The first well-documented case of MCF in bison occurred in South Dakota 1973 and was reported in the scientific literature in 1977.

Q. Are all species of bison susceptible?

A. Yes. There are reliable scientific reports of MCF in both European and American bison (*Bison bonasus* and *B. bison*, respectively). MCF occurs in the Plains subspecies (*B. bison bison*), which is the basis of the commercial bison industry in North America. We are not aware of confirmed cases of MCF in Woodland bison (*B. bison athabascae*) but we recently found that they are subclinically infected at about the same rate as are the Plains bison.

Q. How are bison infected?

A. Epidemiological studies of field outbreaks strongly suggests that sheep infected with OHV-2 are the principal source of MCF outbreaks in bison and cattle. A strong association between outbreaks in cattle and recent exposure to sheep has been documented repeatedly since 1929. Recent data indicate that a similar pattern occurs in bison. In some outbreaks, however, no sheep were in the vicinity immediately prior to the first case being identified.

Q. What is the basic transmission cycle of OHV-2?

A. Lambs are infected after birth. Infection occurs between birth and 4 months of age, with most lambs infected by the age of 4 months or earlier. Placental transmission is possible but rare. Horizontal transmission through physical contact with flock mates is the major mode of transmission among sheep. High levels of OHV-2 viral DNA are consistently found in nasal secretions of sheep, suggesting that the nose is an important portal for OHV-2 shedding. The virus does not cause illness in sheep. Cattle, bison, and deer are also infected by horizontal transmission from sheep, apparently through transfer of virus via nasal secretions.

Q. Can bison get MCF directly from other bison?

A. There is no evidence that transmission occurs horizontally from one bison to another. Currently we are doing a study supported in part by the National Bison Association to establish whether bison-to-bison transmission is a factor in natural outbreaks.

Q. Can bison develop MCF following contact with birds or insects?

A. There is no direct evidence that bison become infected following contact with birds or insects. However, we cannot completely rule out the possibility that birds and perhaps insects mechanically transmit the virus from sheep to bison under certain conditions. More studies are needed in these areas.

Q. Can bison get MCF following contact with rodents or rabbits?

A. There is no proven association between MCF and exposure to rodents or rabbits. Rabbits and rodent species can however be infected experimentally with MCFV.

Q. Does MCF occur in people?

A. No.

Q. What species get MCF in addition to cattle and bison?

A. Natural infections occur in many species of deer such as elk, reindeer and moose, as well as a variety of exotic ruminants. The disease can be transmitted experimentally to laboratory species, but there is nothing to indicate these species are involved in natural transmission. MCF was recently reported in pigs for the first time.

Q. What are the symptoms of MCF in bison?

A. Most infections are characterized by depression, separation from the rest of the herd, loss of appetite, and - in many - bloody diarrhea. Unlike MCF in cattle, discharge from the eyes and nasal passages of affected bison is minimal. Animals develop a fever and may pass bloody urine. The clinical course is generally 1 - 7 days. Most animals die within 3 days of developing clinical signs.

Q. Is abortion a feature of MCF in bison?

A. Yes. There are generally no lesions in the fetus or placenta. It is assumed that abortion is a result of illness in the dam, rather than infection of the fetus. Dams die shortly after they abort.

Q. Is MCF treatable?

A. No. There is no effective treatment for MCF in bison or cattle. There are scattered reports in the scientific literature of animals recovering from MCF following medical treatment. In our experience treatment merely prolongs the clinical course without effecting a cure.

Q. Is there a vaccine against MCF?

A. No. Attempts to develop a protective vaccine to MCF in cattle using the wildebeest virus, alcelaphine herpesvirus-1 (AHV-1), were unsuccessful. No comparable studies have been done on bison to date.

Q. Can the clinical signs of MCF be confused with other diseases?

A. Yes. Bovine viral diarrhea, salmonellosis and pneumonia complex, among others, can be confused with MCF. Testing sick animals is the key to establishing an accurate diagnosis.

Q. What should owners do if they think they have an outbreak of MCF in their herd?

A. Confirm the suspicion of MCF by laboratory tests on sick or dead animals.

Q. What tests are available to confirm a diagnosis of MCF in bison?

A. Three tests are available: histopathology, serological testing for MCFV, and an OHV-2 specific test using the polymerase chain reaction (PCR).

Q. What test should I use to confirm a diagnosis on a live bison with clinical signs suggestive of MCF?

A. The best one to use for diagnosing active disease is the PCR test. Blood collected into an EDTA-anticoagulant tube (purple-top tube) is the best sample to obtain from live animals. Both the PCR test and a newly developed serological test can be run on one purple-top blood sample.

Q. What test should I use to confirm a diagnosis on a dead bison that had clinical signs suggestive of MCF?

A. The carcass of an animal that dies of MCF-like signs should be examined post-mortem by your veterinarian or - better still - a pathologist at a veterinary diagnostic laboratory. A specific set of tissues should be collected and held at 4° C (or frozen if there will be a delay getting samples to a laboratory) to confirm the suspicion. A second set of tissues should be collected into a 10% solution of

formalin for microscopic examination. The best tissues to collect for microscopic examination are kidney, liver, bladder, lymph nodes in thorax and abdomen, pampiniform plexus (blood vessels to testes), lung, spleen, cecum and colon, plus ANY tissue that looks grossly abnormal.

Q. Which bison are most at risk for getting MCF?

A. Animals older than 6 months, particularly if stressed by bad weather, transportation and handling. Large outbreaks occur in feedlots, where stress due to crowding is likely.

Q. Is MCF a seasonal disease?

A. Most outbreaks occur in winter months (December - May). Losses due to MCF can however occur at any time of the year.

Q. If an outbreak occurs, how long could it last?

A. Little information has been collected to answer this question. We have seen outbreaks continue for 16 months in range herds. In feedlots the problem can be a continuing yearly source of losses.

Q. What proportion of bison show serological evidence of exposure to the MCF virus?

A. With currently available test methods, between 15 and 23 %. This is a minimal figure. No test is perfect. It is entirely possible that the tests currently being used for identifying infected normal bison miss a significant percentage of animals. The true rate of subclinical infection could be significantly higher than this.

Q. What proportion of MCFV-seropositive bison subsequently develop clinical signs of MCF?

A. We are doing a study to establish this.

Q. How does MCF kill bison?

A. Following transmission, the MCF virus is presumed to infect lymphoid tissues (spleen and lymph nodes) and cells lining the gut, urogenital tract and nasal passages. The severe inflammation generally causes gastroenteritis, with widespread formation of ulcers particularly in the large bowel. This is the basis for bloody diarrhea, a common and useful diagnostic sign of MCF in bison. The virus causes encephalitis (inflammation of the brain), panophthalmitis (inflammation of the eye) and vasculitis (inflammation of blood vessels).

Q. How widespread is MCF in the commercial bison industry?

A. We are aware of cases in 11 states (Utah, Wyoming, Colorado, Montana, California, Oregon, Ohio, Kansas, Nebraska, North and South Dakota) and three Canadian provinces (Saskatchewan, Ontario and Alberta). The disease is widespread in the bison industry and is commonly misdiagnosed due to lack of specific clinical signs. Many veterinarians are not aware that the post-mortem changes of MCF are somewhat different from those in cattle, and that additional tests are required to make a firm diagnosis of MCF.

Q. How long can bison be infected with MCFV before clinical signs develop?

A. Our limited knowledge on this subject suggests that bison may be infected for extended periods, in some instances years, before developing MCF. More work is needed on this aspect of the disease.

Q. Should healthy bison that are MCFV-test positive by serology or PCF be culled?

A. There is no reason at this time why such animals should be culled. An important question we are trying to answer is whether healthy test-positive bison are at a significantly higher risk of developing MCF, compared to healthy test-negative bison.

Q. How do the bison become infected with OHV-2?

A. In most instances by contact with sheep. The virus is shed from the nasal passages. It is not clear precisely how the virus is transmitted from sheep to bison, but it is probably via the nose and/or mouth. There may be other avenues of transmission that have not yet been recognized.

Q. Can I transmit MCF to healthy bison by handling MCF-affected bison, their discharges or tissues?

A. MCFV is transmitted by sheep in most instances. There is no documented evidence of person-to-bison transmission. Normal veterinary infection control precautions should be followed when caring for a bison suspected to have this viral infection.

Q. What disinfection procedures should be undertaken after a diagnosis of MCF?

A. Since there is no evidence that infectious virus is shed from affected bison, disinfection is not considered to be a worthwhile endeavor, as it will contribute little or nothing to controlling the disease.

Q. How common is MCF in free-ranging bison, such as animals in public herds?

A. We think it is rare. There are inherent problems in tracking diseases like MCF in wild bison. The number of studies of MCF in public herds is small.

Q. What can I do to reduce the risks of MCF in my bison herd?

A. Two things:

- Keep sheep and sheep wastes away from your herd.
- Keep stress to a minimum, since excessive handling appears to be a risk factor.

Q. Where can I get testing and advice in the USA?

A. The laboratory of Drs. Tim Crawford and Hong Li at Washington State University has been engaged in basic research on MCF for the past 10 years. The laboratory can test animals for evidence of antibodies for MCFV, and for DNA unique to OHV-2. You or your veterinarian can contact them by phone (509-335-6035 and 509-335-6002) or email (crawford@vetmed.wsu.edu; hli@vetmed.wsu.edu). The cost per ELISA is \$6.00/blood sample for out-of-state parties, plus a submission fee of 10.00 (one-time). There is a 20% discount on all samples over 10. Dr. Donal O'Toole is a veterinary pathologist at the University of Wyoming. You or your veterinarian can reach him at 307 742 6638, by fax at 307 721 2051, or by email dot@uwyo.edu at the Wyoming State Veterinary Laboratory. The three of us can make available additional information such as reprints of scientific articles published on MCF over the past 10 years.

Q. Is there a laboratory in Canada where I can get PCR testing done for MCF?

A. Yes. The only laboratory in Canada offering the test at present is the Abbotsford laboratory in BC. The charge is \$20 Canadian per PCR plus a submission fee of \$5. Contact Dr. John Robinson at 604-556-3003 or voice-mail his office at 3036.