

# Hemorrhagic Septicemia

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## Importance

Hemorrhagic septicemia is a highly fatal disease of cattle and water buffalo. In susceptible animals, the symptoms progress rapidly from dullness and fever to death within hours. Recovery is rare. In the United States, this disease appears to be endemic in one herd of bison but has not been seen in cattle.

## Etiology

Hemorrhagic septicemia results from infection by two serotypes of *Pasteurella multocida*. Using agar gel immunodiffusion, these serotypes are known as B:2 or E:2. By agglutination, they are 6:B or 6:E. In newer classification schemes, the *Pasteurella multocida* strains that cause hemorrhagic septicemia (as well as most other *Pasteurella* infections) are *P. multocida multocida*.

## Species affected

Epidemics of hemorrhagic septicemia mainly occur in cattle and buffalo; water buffalo are thought to be particularly susceptible. Infections occur infrequently in pigs, sheep, and goats. Cases have also been seen in bison, camels, elephants, horses, donkeys, deer, and yaks. Cattle, water buffalo, and bison appear to be the reservoirs of infection.

## Geographic distribution

Hemorrhagic septicemia is an important disease in Asia, Africa, some countries in southern Europe, and the Middle East. The highest incidence is in Southeast Asia. The B:2 serotype has been seen in southern Europe, the Middle East, Southeast Asia, Egypt, and the Sudan. The E:2 serotype has been reported in Egypt, the Sudan, the Republic of South Africa, and several other African countries. Hemorrhagic septicemia also seems to be endemic in one herd of bison in the United States. Three confirmed outbreaks have been reported in these bison; however, there is no evidence that the disease spread to neighboring cattle. Neither serotype of *P. multocida* is known to occur in Australia, New Zealand, South America, or Central America.

## Transmission

*P. multocida* is transmitted by direct contact with infected animals and on fomites. Cattle and buffalo become infected when they ingest or inhale the causative organism, which probably originates in the nasopharynx of infected animals. In endemic areas, up to 5% of cattle and water buffalo may normally be carriers. The carrier rate can increase to more than 20% for a few weeks after an outbreak.

The worst epidemics occur during the rainy season, in animals in poor physical condition. Stresses such as a poor food supply are thought to increase susceptibility to infection, and close herding and wet conditions seem to contribute to the spread of the disease. *P. multocida* can survive for hours and possibly days in damp soil or water. Viable organisms are not found in the soil or pastures after 2 to 3 weeks. Biting arthropods do not seem to be significant vectors.

## Incubation period

In experimental infections with lethal doses, cattle or buffalo develop clinical signs within a few hours and die within 18 to 30 hours. In natural infections, the incubation period is usually 1–3 days but some animals can carry the organism for varying periods without symptoms.

## Clinical signs

Most cases in cattle and buffalo are acute or peracute. A fever, dullness, and reluctance to move are the first symptoms. Salivation and a serous nasal discharge develop, and edematous swellings become apparent in the pharyngeal region. These swellings spread to the ventral cervical region and brisket. The mucous membranes are congested. Respiratory distress occurs, and the animal usually collapses and dies 6 to 24 hours after the first symptoms were seen. Either sudden death or a protracted course up to 5 days are

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also possible. Animals with clinical signs, particularly buffalo, rarely recover. Chronic cases do not seem to occur.

## Post mortem lesions [Click to view images](#)

At necropsy, widespread hemorrhages, edema, and hyperemia are seen. Swelling of the head, neck, and brisket occurs in nearly all cases. This edema consists of a coagulated serofibrinous mass with straw-colored or bloodstained fluid. Similar swellings can also be found in the musculature. Subserosal petechial hemorrhages may occur throughout the body, and the thoracic and abdominal cavities often contain blood-tinged fluid. Scattered petechiae may be visible in the tissues and lymph nodes, particularly the pharyngeal and cervical nodes. These nodes are often swollen and hemorrhagic. Pneumonia or gastroenteritis occasionally occurs, but usually is not extensive. Atypical cases, with no throat swelling and extensive pneumonia, are sometimes seen.

## Morbidity and Mortality

Morbidity depends on immunity and environmental conditions, including both weather and husbandry. In endemic regions, 10–50% of cattle and buffalo become immune after exposure. Morbidity is higher when animals are herded closely, in poor condition, or exposed to wet conditions. Mortality is nearly 100% unless the animal is treated very early in the disease; few animals survive once they develop clinical signs.

Antibiotic treatment is effective if it is started very early, during the pyrexemic stage. Various vaccines can provide protection for 6 to 12 months.

## Diagnosis

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### Clinical

Hemorrhagic septicemia should be suspected in animals with a rapid course of infection, fever and edematous swellings in the throat, cervical, and parotid regions. A high herd incidence and high mortality in affected animals is also suggestive of this disease. In sporadic cases, hemorrhagic septicemia may be difficult to diagnose.

### Differential Diagnosis

The differential diagnosis includes other causes of sudden death such as lightning strikes, snakebite, blackleg, rinderpest, and anthrax. Acute salmonellosis and pneumonic pasteurellosis should also be considered.

### Laboratory Tests

Hemorrhagic septicemia is usually diagnosed by culturing the organism from affected animals. Success usually depends on collecting a fresh sample that is free from contaminating bacteria and post-mortem invaders. In Gram-stained blood or tissue smears, the organisms are Gram-negative,

short, ovoid, coccoid forms with bipolar staining. Some pleomorphism can be expected. *P. multocida* can be grown on blood agar or casein/sucrose/yeast (CSY) agar. Fresh *P. multocida* colonies are smooth, grayish, translucent, glistening, and approximately 1 mm diameter after incubation on blood agar for 24 hours at 37°C. Larger colonies are seen on CSY agar, and smaller colonies may develop from old cultures. Biochemical tests are used for identification; the strains that cause hemorrhagic septicemia produce hyaluronidase. Immunologic tests to identify the E:2 and B:2 serotypes include a rapid slide agglutination test or indirect hemagglutination test for capsular typing, an agglutination test for somatic typing, agar gel immunodiffusion, and counter immunoelectrophoresis.

If in vitro culture is not successful, samples may be inoculated into a mouse and blood from the mouse used to identify the organism. Polymerase chain reaction techniques can also be used for detection and presumptive identification of the organism from clinical samples and pure or mixed bacterial cultures.

Serologic tests are not normally used for diagnosis; however, high titers (1:160 or higher by indirect hemagglutination) in surviving in-contact animals are suggestive of the disease.

### Samples to collect

**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.** There are no confirmed reports of human infections with *P. multocida* serotypes B:2 and E:2; however, other serotypes do cause human infections and precautions should be taken to avoid exposure.

*P. multocida* is not always found in blood samples before the terminal stage of the disease, and is not consistently present in nasal secretions. In freshly dead animals, a heparinized blood sample or swab should be collected from the heart within a few hours of death. A long bone freed of tissue should be taken from animals that have been dead for a long time. Other samples that have been used include liver, lung, kidney, spleen, ribs, and the tips of the ears. If a necropsy is not feasible, blood samples can be taken from the jugular vein by aspiration or incision. Blood samples should be placed in a standard transport medium and transported on ice.

### Recommended actions if hemorrhagic septicemia is suspected

#### Notification of authorities

Hemorrhagic septicemia must be reported to state or federal authorities immediately upon diagnosis or suspi-

cion of the disease. Federal: Area Veterinarians in Charge (AVICS) [http://www.aphis.usda.gov/vs/area\\_offices.htm](http://www.aphis.usda.gov/vs/area_offices.htm)

State vets: <http://www.aphis.usda.gov/vs/sregs/official.html>

## Quarantine and Disinfection

Hemorrhagic septicemia is contagious to contact animals and can be spread on fomites. The organisms can also survive for less than 2–3 weeks in damp soil and water. *P. multocida* is susceptible to mild heat (55°C) and most hospital disinfectants.

## Public health

There are no confirmed reports of human infections with *P. multocida* serotypes B:2 and E:2; however, other serotypes do cause human infections and precautions should be taken to avoid exposure.

## For More Information

World Organization for Animal Health (OIE)

<http://www.oie.int>

OIE Manual of Standards

[http://www.oie.int/eng/normes/mmanual/a\\_summry.htm](http://www.oie.int/eng/normes/mmanual/a_summry.htm)

OIE International Animal Health Code

[http://www.oie.int/eng/normes/mcode/A\\_summry.htm](http://www.oie.int/eng/normes/mcode/A_summry.htm)

USAHA Foreign Animal Diseases book

[http://www.vet.uga.edu/vpp/gray\\_book/FAD/](http://www.vet.uga.edu/vpp/gray_book/FAD/)

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