

BACTERIAL DISEASES OF ANIMALS

BACTERIAL DISEASES

ANTHRAX

Anthrax is an infectious disease caused by a bacterium called *Bacillus anthracis*, which can change into spores that can last for a long time in the environment before germinating. It is carried by wild and domestic animals in Asia, Africa and parts of Europe.

There are two main types of anthrax. The **cutaneous anthrax** starts as a skin bump that ulcerates, which is not generally a serious illness. The second type is **inhalational anthrax**, is normally less common and symptoms begin as a flu-like illness which progresses to pneumonia, respiratory failure and septicaemia, which can lead to shock and death. There is a third type, **intestinal anthrax**, but this is a very rare form of food poisoning and results in fever and severe gut disease.

Cutaneous anthrax tends to occur through direct contact with the skin or tissues of infected animals. The early stages of the lesion are noticed about 3 days from exposure, although the incubation period can be up to 60 days. Inhaled anthrax usually shows up about 2-3 days after exposure and can be fatal within the next 2-3 days. The spores can be inhaled directly into the lungs. Spores with food cause the intestinal form of the disease.

Normally 95 percent of anthrax cases are cutaneous and are caused by direct contact with abrasions on the skin. There have been no known cases of person-to-person spread of anthrax pneumonia and it is not thought to be a significant health risk.

Treatment can be done with Ciprofloxacin and doxycycline are also used as prophylaxis for people who have been exposed. Early treatment is needed if inhaled anthrax is suspected. There is an immunisation against anthrax but it takes five doses of vaccine over the course of a year to get immunity. This makes immunisation too slow to deal with accidental or deliberate exposure. It is normally offered to those who handle infected animals, and laboratory staff who work with the bacteria. Swabs and smears can be taken from infected exposed people and blood can be analysed for the presence of the bacteria.

LEPTOSPIROSIS

It is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*. Symptoms of leptospirosis include high fever, severe headache, chills, muscle aches, and vomiting, and may include jaundice (yellow skin and eyes), red eyes, abdominal pain, diarrhea, or a rash. If the disease is not treated, the animal could develop kidney damage, meningitis, liver failure, and respiratory distress. In rare cases death occurs. Treatment is done with antibiotics.

ANAPLASMOSIS

Anaplasmosis is a type of tick fever that is caused by invasion of red blood cells by the rickettsial blood parasite *Anaplasma ovis*. In cattle, the disease is caused by *A. marginale* or *A. centrale*. Transmission is through insect vectors, especially horse flies, ticks and flies. Ticks are the natural vectors and a range of tick species has been shown to be capable of transmitting infection, e.g. *Boophilus*, *Dermacentor*, *Rhipicephalus*, *Ixodes*, *Hyalomma*, *Argas* and *Ornithodoros*. There is also some evidence that it can be transmitted to the fetus in the womb. Cattle over 2 years of age become very ill and approximately 50% die unless treated. Usually, once the cattle become infected, and if they survive, stay infected for life. They are "immune carriers"—they do not get sick, but act as a reservoir for other susceptible animals.

The important symptoms are fever, anemia and jaundice or yellowing of the mucous membranes. In cattle, the severity of the disease is directly related to age, with adults showing the greatest difficulty. Additionally, a drop in milk production, weight loss, depression, dehydration, constipation and lack of appetite may be observed. Some animals which recover remain weak and emaciated through life.

Most of the sick animals die within a few days of the fever starting, if they are not treated. The use of **tetracyclines** or **imidocarb dipropionate** is effective, however, the drug must be administered early in the disease. Tick control by acaricide dipping is widely used in endemic areas. Anaplasmosis vaccines are readily available and are highly effective. The most commonly used vaccine is a live *Anaplasma centrale* vaccine used either singly or in combination with *Babesia bovis* vaccine.

TULAREMIA

It is caused by the bacterium *Francisella tularensis* found in animals, especially rodents, rabbits, and hares. Symptoms of tularemia could include: sudden fever, chills, headaches, diarrhoea, muscle aches, joint pain, dry cough and progressive weakness. People can also catch pneumonia and develop chest pain, bloody sputum and can have trouble breathing and even sometimes stop breathing. Other symptoms include ulcers on the skin or mouth, swollen and painful lymph glands, swollen and painful eyes, and a sore throat.

Disease can spread by being bitten by an infected tick, deerfly or other insect, eating or drinking contaminated food or water, breathing in the bacteria, *F. tularensis*. Tularemia is not known to be spread from person to person. The disease can be fatal if it is not treated with the right antibiotics. The drug of choice for treating tularemia is streptomycin or gentamicin, although other antibiotics also are also effective.

Several precautions can protect individuals from tularemia.

Avoid drinking, bathing, swimming or working in untreated water where infection may be common among wild animals.

- Use impervious gloves when skinning or handling animals, especially rabbits.

- Cook the meat of wild rabbits and rodents thoroughly.
- Avoid being bitten by deer flies and ticks.

RELAPSING FEVER

Louse-borne relapsing fever

Borrelia recurrentis is the only agent of louse-borne disease. *Pediculus humanus*, is the specific vector. Louse-borne relapsing fever is more severe than the tick-borne variety.

It occurs in poor living conditions, famine and war conditions. Mortality rate is 1% with treatment but 30-70% without treatment. Diagnosis includes severe jaundice, severe change in mental status, severe bleeding, and prolonged QT interval on ECG.

Lice that feed on infected humans acquire the *Borrelia* organisms that then multiply in the gut of the louse. When an infected louse feeds on an uninfected human, the organism gains access when the victim crushes the louse or scratches the area where the louse is feeding. *B. recurrentis* infects the person via mucous membranes and then invades the bloodstream. Cattle lice can spread the disease in animals.

Tick-borne Relapsing Fever

Other relapsing infections are acquired from other *Borrelia* species, such as *Borrelia hermsii* or *Borrelia parkeri*, which can be spread from rodents, and serve as a reservoir for the infection, via a tick vector. *Borrelia hermsii* and *Borrelia recurrentis* cause very similar diseases although the disease associated with *Borrelia hermsii* has more relapses and is responsible for more fatalities, while the disease caused by *B. recurrentis* has longer febrile and afebrile intervals and a longer incubation period.

Tick-borne relapsing fever is found primarily in Africa, Spain, Saudi Arabia, Asia, and certain areas in the Western U.S. and Canada. It is *Borrelia duttoni* transmitted by the soft-bodied African tick *Ornithodoros moubata* that is responsible for the relapsing fever found in Central, East and southern Africa.

BOVINE TUBERCULOSIS

There are three types of TB – human, avian, and bovine. Human TB is rarely transmitted to non-humans, avian TB is typically restricted to birds, and bovine TB – or cattle TB – is the most infectious, capable of infecting most mammals. Bovine TB is caused by the bacterium *Mycobacterium bovis*, which is part of the *Mycobacterium tuberculosis* complex. Bovine TB is spread through the exchange of respiratory secretions between infected and uninfected animals. Bacteria released into the air through coughing and sneezing can spread the disease to uninfected animals. Non-cerviid animals are most likely to contract TB from feeding on infected tissues from deer carcasses.

Bovine TB is a chronic disease and it can take years to develop. *M. Bovis* grows very slowly and only replicates every 12-20 hours. The lymph nodes in the animal's head usually show infection first and as the disease progresses. Lesions will begin to develop on the surface

of the lungs and chest cavity. Non-cerviid animals do not develop the disease as extensively and lesions are usually not found in lungs or other tissues.

Infected lymph nodes will contain one or more necrotic nodules, which may vary in size and be filled with yellow-green or tan pus. Coughing, nasal discharge, and difficulty in breathing can result in cases where the lungs become severely affected. In some instances, superficial lymph nodes in the neck will develop large abscesses that may rupture and drain through the skin.

Diagnosis is done by removal of suspicious looking lymph nodes for further testing. *M. Bovis* is unique among the bacteria because they have a lot of waxy material in their cell walls. Because of the waxy material (known as mycolic acid), the usual stains for looking at bacteria with a microscope do not work.

Since there are no effective vaccines for the disease, a combination of wildlife disease surveys and deer management strategies are being used to eliminate the disease in wild deer. Humans can be skin-tested to determine if they have been exposed to TB.

Common Bacterial Diseases in Dogs

Campylobacteriosis

Campylobacteriosis is a disease that produces acute infectious diarrhea in puppies. It also occurs in kennel dogs and strays-most of whom are in poor condition and are suffering from other intestinal infections.

The bacteria is acquired by contact with contaminated food, water, uncooked poultry or beef, and animal feces. Campylobacteria can survive for up to five weeks in water or unpasteurized milk.

The incubation period is one to seven days. Signs of acute infection include vomiting and a watery diarrhea that contains mucus and sometimes blood. The disease usually runs its course in five to fifteen days, but may be followed by chronic diarrhea in which bacteria is shed in the feces.

Treatment: Treat mild diarrhea. Keep the dog warm, dry, and in a stress-free environment. More severely affected dogs will require veterinary management with intravenous fluids to correct dehydration. Antibiotics may be advisable. Erythromycin and ciprofloxacin are the drugs of choice.

Public health considerations:Campylobacteriosis is a common cause of diarrhea in humans. Most human cases arise from contact with newly acquired kittens and puppies who are suffering from diarrhea. Parents should be aware that puppies with diarrhea may harbor a human pathogen. Good hygiene is essential, especially for young children and people who are immunocompromised.

Coliobacillosis (E. Coli)

Coliobacillosis is an infectious diarrhea caused by the bacteria E. coli. There are some strains of E. coli that are not part of the normal intestinal flora. When ingested, these strains are capable of producing acute diarrhea. E. coli can be acquired from infected drinking water, food, or fecal matter. This bacterial infection is a risk in dogs fed a raw diet, unless excellent food-handling hygiene is practiced at all times.

Salmonella

Several bacteria of the salmonella species are capable of producing acute infectious [diarrhea](#) in [dogs](#). Salmonella remain alive for many months or years in soil and manure. In dogs, the disease is acquired by consuming raw or commercially contaminated foods, by eating animal manure, or by making oral contact with surfaces that have been contaminated by the diarrhea of an infected dog. This bacterial infection is a risk in dogs fed a raw diet, unless excellent food-handling hygiene is practiced at all times.

Puppies and young adults are most susceptible, as are dogs whose natural resistance has been compromised by a viral infection, malnutrition, [parasites](#), or being housed in crowded, unsanitary quarters.

Public health considerations: **Salmonellosis** is a zoonotic disease, so care must be taken to practice excellent hygiene when dealing with a dog with salmonellosis. It is important to wear gloves when cleaning up feces and to disinfect areas where an affected dog has eliminated.

Bordetella

Bordetella bronchiseptica bacteria are frequently found in dogs with the **kennel cough** complex and other respiratory diseases. Signs of upper respiratory illness caused by bordetella include a dry, hacking [cough](#) accompanied by a clear nasal or [eye discharge](#). In puppies and immune-compromised adult animals, secondary bacterial invasion of the lower respiratory tract following viral illness may cause life-threatening [pneumonia](#). Dogs who are carrying the organism and may not even be ill themselves, may still cough or exhale the organism into the air. Healthy dogs can then be infected by breathing in that contaminated air.

The bacteria can be cultured from nasal swabs or transtracheal washings.

Treatment: Treat all upper respiratory infections by placing the animal in a warm, draft-free environment, humidifying the atmosphere, and avoiding stressful activities that can interfere with a smooth recovery. Antibiotics are indicated if the dog develops fever and a mucopurulent [nasal discharge](#). Antibiotics are also indicated for all cases of upper respiratory infection in which bordetella is isolated. Antibiotics given by nebulizer may be more effective than those given orally or by injection. This is because the bacteria attach to the mucosal surface of the respiratory tract and are difficult to reach with systemic antibiotics.

Prevention: Bordetella vaccinations are not routine, but may be advisable for show dogs, boarded dogs, dogs who go to grooming salons or obedience classes, and dogs who live in kennels.