



# Update

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## Breeders Should Take Precautions to Prevent Canine Brucellosis

**C**anine brucellosis can wipe out a kennel. The highly contagious reproductive disease can cause infertility, abortions and stillbirths in dogs. Many states require kennels infected with brucellosis to quarantine, sterilize or euthanize affected dogs — all causing an enormous emotional and economic toll.

"This disease brought total ruin to one breeder we worked with to the point she had to depopulate her entire kennel," says Lin Kauffman, D.V.M., a faculty clinician at the Lloyd Veterinary Medical Center at Iowa State University College of Veterinary Medicine in Ames, Iowa.

Many are unfamiliar with canine brucellosis, but its incidence is on the rise, according to Kauffman.

Brucellosis is predominantly seen in rural areas of the Southeast. One survey showed approximately 6 percent of dogs in that region are infected. Mainly stray and feral dogs and those from so-called "puppy mills" have been affected, but spread of the disease to the rest of the dog industry, including show dogs and field trial dogs, has drawn attention, Kauffman says.

Canine brucellosis is caused by the bacterium *Brucella canis* or *B. canis*, one of six species of the genus *Brucella*. The bacterium was first identified in dogs in 1966, particularly in Beagles in research colonies.

Since then, the disease has been found in Australian Shepherds, Boston Terriers, Chihuahuas, Cocker Spaniels, Dachshunds, German Shepherd Dogs, Golden Retrievers, Labrador Retrievers, Lhasa Apsos, Miniature Pinschers, Pomeranians, Poodles, Shih Tzus, Yorkshire Terriers, and mixed-breed dogs. Cases of brucellosis have been documented worldwide.

"Any breed of dog and either gender can become infected; however, the disease is usually detected and monitored in the intact male and female canine," says R. Bruce Hollett, D.V.M., M.S., DACT, associate professor in the Department of Large Animal Medicine at the University of Georgia College of Veterinary Medicine in Athens, Ga.

Fortunately, death caused by the disease is rare. No vaccine exists, and

treatment is often considered challenging. Dogs generally are treated with at least two antibiotics that are given over a 30-day period. The treatment regimen can be both extensive and expensive, and may require repeat treatments if a dog continues to test positive.

### How Brucellosis Spreads

Canine brucellosis spreads rapidly especially in confined populations and can lead to as many as 75 percent fewer puppies weaned. The disease can spread through fresh-chilled and frozen semen, so dogs do not need to breed naturally to become infected. There are no brucellosis testing requirements for interstate or intrastate travel or for sale of dogs, so known and unknown positive dogs can spread the disease. The risk of infection through bodily secretions puts dogs at risk whenever they come into contact with other dogs.

Though mainly a sexually transmitted disease, brucellosis can also be transmitted via nose, mouth and eye contact with infected vaginal discharge, aborted fetuses, feces, saliva, blood, secretions from the eyes and nose, semen, and urine. Bacteria also can enter through broken skin. Infected females can pass the disease to puppies during pregnancy or through

her milk after they are born.

Once the bacteria enter the body, they target reproductive tissue, penetrating and growing intracellularly. In females, the bacteria live in the vagina, uterus and placenta. In males, the organism is found in the prostate and testicles. *B. canis* infiltrates the bloodstream and can enter organs, including the spleen, liver, lymph nodes, eyes and vertebral column.

Canine brucellosis has a wide range of signs that can mimic characteristics of other diseases. Signs in both males and females include: lethargy; fatigue; unwillingness to breed; joint pain; inflammation of the lymph nodes; eye infections; poor hair coat; exercise intolerance; weight loss; lameness; back pain; and behavioral changes.

Extreme signs include infertility in both sexes. Males can suffer swollen or shrunken testicles, inflamed prostate and poor semen quality. In females, brucellosis causes failure to conceive, stillbirths, and early embryonic death or fetal resorption within 10 to 20 days. Approximately 75 percent of infected females abort after 45 to 59 days of gestation. If carried to term, pups infected in the womb or through their mother's milk can die shortly

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### A Danger to Humans

**I**n addition to the danger to dogs, canine brucellosis is a zoonotic disease that can affect humans. It is important to note, however, that humans are rarely infected.

As with dogs, no human vaccine is available, although the disease is easily managed with appropriate antibiotics. Children, pregnant women and people with a compromised immune system are considered vulnerable.

Humans can become infected through direct contact with fluids from infected dogs, including vaginal discharge, semen, blood, milk, urine, feces, or an aborted fetus. Bacteria can enter through the mouth, nose, eyes or broken skin. Infection can also result from inhaling dust and dirt from affected areas.

On average, signs of human infection appear three to four weeks after exposure, but can begin in one week or not for several months. Signs are similar to flu and include fever, headache, weakness, night sweats, chills, back pain, fatigue, enlarged lymph nodes, and weight loss. Proper diagnosis is not necessary as antibiotic treatment generally resolves signs of illness.

When handling infected dogs or materials, wear protective clothing such as latex or rubber gloves, a facemask and eye goggles. Wash hands thoroughly after touching dogs and do not allow an infected dog to lick your face.

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after whelping.

Some dogs show no signs of the disease, complicating diagnosis. "The dog could look perfectly healthy to his or her owner and be infected," says Hollett, a reproduction specialist who is board-certified in theriogenology.

### Testing for *Brucella Canis*

Blood and bacterial culture tests can detect infection with *B. canis*. Blood tests identify the presence of antibodies to the bacterium, which generally develop within eight to 12 weeks after infection. Culture tests determine the presence of the bacterium by inducing it to grow from a sample of vaginal discharge, bone marrow, milk, blood, urine, semen or tissue from the placenta, aborted fetus, lymph nodes, spleen or liver.

There are problems with both types of test. Neither test allows early detection and both can lead to erroneous results. Variation in incubation period from two weeks to several months means early testing can result in a false negative even as the dog is contagious. Because of that, dogs must be tested multiple times over the course of months, costing time and money. Although culture tests are the current diagnostic standard, culturing *B. canis* can be difficult.

"*B. canis* is very picky about what media it grows on and under what conditions, so only a positive culture really means anything," Kauffman says.

Kauffman and fellow researchers at Iowa State University are working to develop a DNA-based test to detect *B. canis* earlier and more reliably. The Canine Health Foundation is funding the research.

The researchers have already developed a test sensitive enough to detect as little as one bacterium in one milliliter of blood, but they discovered that the organism does not remain in the blood long before sequestering in reproductive tissue. They now are trying to determine the optimal diagnostic sample, and are considering urine, semen and vaginal swabs.

Using a polymerase chain reaction (PCR) assay, the scientists extract bacterial DNA from the sample and use fluorescent markers to detect the presence of *B. canis*. Because a PCR assay detects the actual bacterium rather than the antibodies a dog develops in response to it, this test can detect the disease from the time of infection. Such early detection would allow positive dogs in a kennel to be identified in one round of testing and help limit the spread of the disease.

"The diagnostic sampling for this test would really be no different than what it currently is, and potentially it may be easier for breeders to collect samples," Kauffman says. "Instead of blood samples normally collected by veterinarians, the diagnostic samples

for this assay would potentially be vaginal swabs for females and urine samples for males."

Kauffman hopes to have a DNA test available later this year.

Breeders should seek veterinary advice regarding treatment, which includes one class of antibiotics such as tetracycline, chlortetracycline, minocycline or doxycycline. The most successful treatment originally combined tetracycline and dihydrostreptomycin antibiotics, says Hollett, noting that dihydrostreptomycin is no longer available for use in dogs. Veterinarians have found successful alternative treatment using a combination of

### Seeking Samples

Researchers at Iowa State University in Ames, Iowa, are seeking male urine and semen samples from dogs suspected of being infected with the *Brucella canis* bacterium. The samples will be used in a study aimed at developing an early DNA detection test for brucellosis. For more information, e-mail researcher Lin Kauffman, D.V.M., at [linkauf@iastate.edu](mailto:linkauf@iastate.edu).

antibiotics; however, the entire course of antibiotics should be completed to avoid false-negative test results.

More than one course of treatment may be required, and testing should take place one month after completing any treatment. Before being considered clear of the disease, dogs must test negative on two consecutive tests given four weeks apart. Not all treatment will work, and relapse is possible. Even after treatment or sterilization, dogs can shed bacteria for years.

"There is no 'cure' for a dog whose diagnosis of canine brucellosis has been confirmed," Hollett says. "Antibiotic regimens do lower the amount of bacteria passing through the dog's lymphatic and circulatory systems but do not totally eliminate all organisms from the dog's body."

### Prevention Is Best Medicine

Prevention is cheaper than quarantine. "The potential economic as well as emotional impact on breeders can be huge," Kauffman says. "If the infection is bad enough, an owner may opt to euthanize an entire kennel and go out of business altogether or start over again with brand new, noninfected breeding stock."

To avoid such hardship, breeders are encouraged to test all dogs annually and before breeding. In females, testing is more accurate before or during heat due to the female's sensitivity to the test at this time.

Breeders also are advised to not breed infected dogs, and consider spaying or neutering them. Dogs bred intensively outside the facility should be tested two to four times a year. Before breeding with dogs of

unknown brucellosis status, ask to see test results. New dogs brought into the kennel for breeding stock should always be quarantined and tested before adding to the rest of the kennel.

"Breeders should test every animal in their respective kennel or licensed facility," Hollett says. "Even animals that have been neutered or have an undefined history from a previous location may test positive. Brucellosis continues to be a problem common in dogs simply because people lack enough information about it to make an intelligent choice or simply avoid having their breeding stock checked on a routine basis."

The increased incidence of canine brucellosis can be attributed to many causes, including deficient knowledge, lack of uniformity in state regulations and reluctance to test for fear of repercussions — financial and otherwise.

"This disease carries a lot of stigma. Some states will not even recognize that they have this disease in their state," Kauffman says. "It is like a dirty secret that no one wants to talk about, and if you are a breeder who has the disease or has had it, then no one wants to associate with you or your dogs."

Dogs that show no signs of infection can be unknowingly bred or sold. An unscrupulous breeder may mask the bacteria with antibiotics or take a dog for testing in a state with lenient reporting regulations.

"Until states duplicate the governance of canine diseases, the disease will cross state lines with each dog that is sent for breeding or to a show or field trial and has a positive infection that is unknown to the breeder or owner," Hollett says.

Kauffman agrees. "Until all the states unite and pass legislation requiring *B. canis* testing of dogs for travel across state lines and for sale then the United States is going to have a problem with this disease," she says.

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