

**BOVINE BRUCELLOSIS**

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
<p>Ungulates (cattle, bison, buffalo, elk, goats, sheep, camel, etc.), swine, carnivores, rodents, voles, pinnipeds, cetaceans, humans.</p>	<p>Usually ingestion of materials contaminated by birthing or abortion products (fluids, placenta, fetus); direct contact with aforementioned materials or semen, ingestion of unpasteurized milk or dairy products.</p> <p>Fomites and mechanical vectors can transmit the organism. The organism can pass abraded skin or intact mucous membranes and persists in the environment for up to 60 days, especially at low temperatures or high organic material. Venereal transmission also can occur with <i>B. suis</i>, <i>B. ovis</i>, and <i>B. canis</i></p>	<p>Abortion (mid to late term), stillborn or weak calves neonatal death, placentitis, endometritis, epididymitis, seminal vesiculitis, orchitis, testicular abscess, spondylitis or arthritis. Many times no other outward clinical signs.</p> <p>Chronically infected animals may have decreased milk production or possible hygromas.</p>	<p>High morbidity in naïve herds. Generally a mild disease in animals (except abortion) with chronically infected herds stabilizing at 30-50% seroprevalence.</p> <p>Produces undulant fever in humans that is chronic and debilitating, but not generally life threatening; however, <i>B. melitensis</i> and <i>B. suis</i> tend to induce myocarditis which can be associated with fatality.</p>	<p>Antibiotics in humans; none in animals</p>	<p>Avoidance, quarantine incoming animals. Test and slaughter of serologic reactors. Long term antibiotics for humans. But, antibiotics are of questionable value in animals.</p> <p>Use of personal protective equipment (adequate gloves, protective clothing, respiratory and mucosal membrane protection) for vocational exposure in humans.</p>	<p>Yes</p>

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<b>Susceptible animal groups:</b> Ungulates (cattle, bison, buffalo, elk, goats, sheep, reindeer, camel, etc.), swine, carnivores, rodents, pinnipeds, cetaceans, horses, and humans.
<b>Causative organism:</b> <i>Brucella</i> species generally have a preferred natural host but will frequently infect other hosts. <i>Brucella abortus</i> (cattle and humans) is the primary causative agent. However, there are other <i>Brucellae</i> that include: <i>B. melitensis</i> (small ruminants and cattle) although it is not present in US, this organism has been seen in humans in the US from imported non-pasteurized dairy products. <i>B. ovis</i> (small ruminants), <i>B. suis</i> (swine, reindeer – biovarian 4, cattle), <i>B. canis</i> (dogs), <i>B. neotomae</i> (rodents), <i>B. microti</i> (voles and foxes), <i>B. ceti</i> (cetaceans), <i>B. pinnipedialis</i> (pinnipeds) and <i>B. inopinata</i> (humans). <i>Brucellae</i> are gram negative non-enteric facultative intracellular coccobacilli.
<b>Zoonotic potential:</b> Relatively high.
<b>Distribution:</b> World-wide, although regionally it is limited in North America (Greater Yellowstone Area – <i>B. abortus</i> in bison and elk). <i>Brucella suis</i> transmitted from feral swine is increasingly occurring in cattle housed in the southeast US. Increasingly <i>B. melitensis</i> is occurring in cattle in central Asia and the Middle East.
<b>Incubation period:</b> Quite variable, 2 weeks to 1 year or longer.
<b>Clinical signs:</b> Abortion, weak calves, neonatal death, placentitis, endometritis, epididymitis, seminal vesiculitis, orchitis, testicular abscess, and spondylitis may occur. Often, no other outward clinical signs. Chronically infected animals may be “poor doers”. In horses, infection may produce “fistulous withers”. In humans, severe “flu-like” signs, fatigue, headache, fever, chills, night sweats, joint pain, backache, weight and appetite decreases, spontaneous improvement but recrudesces (“undulant fever”). In cattle, <i>B. suis</i> does not appear to cause abortions in cattle but does colonize the mammary gland with subsequent high CFU within milk.
<b>Post mortem, gross, or histologic findings:</b> <u>Aborted fetus:</u> autolysis (common intra-uterine death), subcutaneous edema, serosanguineous fluid in body cavities (peritoneum, pericardium and pleura), possible spleno- and hepatomegaly, pneumonia. Placentitis (inflamed or necrotic cotyledons), “leathery” intercotyledonary zones. <u>Adults:</u> granulomatous to purulent inflammation of reproductive tract, hygromas, draining tracts.
<b>Diagnosis:</b> Serology (agglutination – screening; FPA and CF – confirmatory; ELISA -available), Milk ring Test (BRT), perhaps bacterial isolation, newer PCR tests are available. Confirmatory tests: Culture of the organism is the “Gold Standard” for diagnosis. Confirmatory tests include standard tube test, Rivanol test, complement fixation test (CF), fluorescence polarization assay (FPA), particle concentration fluorescence immunoassay (PCFIA), semen plasma test, and standard plate test. 9 CFR Ch. I Part 78
<b>Material required for laboratory analysis:</b> Microscopic examination of abortion products, Stamp’s modification of Ziehl-Neelsen method for presumptive diagnosis (low yield procedure). Culture of fetal membranes, fetal stomach contents, many fetal organs, vaginal secretions, milk, semen, arthritis or hygroma fluids (not often successful). Serology (ante-mortem or post-mortem) AGID, ELISA (most common procedures).
<b>Relevant diagnostic laboratories:</b> Samples are to be tested for brucellosis only in cooperative State–Federal brucellosis laboratories or by persons who are authorized by Program officials to conduct the tests. See “Brucellosis Eradication: Uniform Methods and Rules” by the USDA APHIS.
<b>Treatment:</b> None in cattle.

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**Prevention and control:** All states are free of disease in commercial herds, except for the Greater Yellowstone Park Area. Test and slaughter in domestic cattle. Bulk Milk test (*Brucella* Ring Test) for herd; individual tests include blood agglutination and/or the CARD test. Animals that are positive are quarantined and only able to move to slaughter; samples are collected for culture. Market Cattle Identification (back tags) on sale barn animals to allow trace back in the event of a seropositive reactor. Cattle vaccines are available (e.g. strain 19 [old] and RB51). Personal protective equipment (PPE) for humans is good preventive measure, especially with exposure to birthing fluids.

Regarding vaccination in zoo and wildlife species:

- Abortions have been associated with *Brucella abortus* strain 19 live vaccination in bison; this vaccine offers limited protection against infection and abortion in bison and elk.
- *Brucella abortus* strain RB51 is a live vaccine for use in cattle that protects at least as well strain 19, does not cause abortion, and induces antibodies that can be distinguished from antibodies induced by natural infection.
- Calftooth vaccination of bison with strain RB51 vaccination may reduce transmission of brucellosis; the vaccine is not, however, recommended in elk or reindeer.

**Suggested disinfectant for housing facilities:** Most disinfectants are effective, e.g. 2.5% hypochlorite, 70% ethanol, formalin, glutaraldehyde, xylenes, iodophors, phenolics, 20% slaked lime, 2-3% caustic soda, 10 minutes boiling.

**Notification:** Contact state veterinarian and/or AVIC.

**Measures required under the Animal Disease Surveillance Plan:**

Brucellosis Eradication Program (see Uniform Methods and Rules)

- Bulk Milk testing (*Brucella* Ring Test)
- Serum testing at sale barns (blood agglutination test)
- Fluorescence polarization assay
- CARD test (cow side rapid diagnostics)
- Market Cattle Identification (back tags)

Currently in the US, sampling surveillance is performed at large slaughter plants or in states with high risk for exposure.

**Measures required for introducing animals to infected animal:** Infected animals are quarantined and should not be introduced to other animals.

**Conditions for restoring disease-free status after an outbreak:** Brucellosis Eradication Program (see Uniform Methods and Rules) 12 consecutive months without seropositive evidence of disease is required.

**Experts who may be consulted:** Federal and state veterinary authorities (AVIC and state veterinarian, respectively); international (OIE).

**References:**

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4. USDA APHIS: Facts about Brucellosis [http://www.aphis.usda.gov/animal\\_health/animal\\_diseases/brucellosis/downloads/bruc-facts.pdf](http://www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/downloads/bruc-facts.pdf). Accessed 1 August 2013.
5. USDA APHIS Veterinary Services National Brucellosis Surveillance Strategy December 2010

## **BOVINE BRUCELLOSIS**

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