

### What is the treatment?

The cornerstone of treatment for brucellosis is antibiotics. Because of the high relapse rate associated with the disease, the use of a multidrug (two or more) antibiotic regimen is recommended. The antimicrobials most commonly used include doxycycline, streptomycin, rifampin, gentamicin, and trimethoprim-sulfamethoxazole. Presently, the treatment of choice is a combination of rifampicin (600-900 mg) along with doxycycline (200 mg) to be given daily in the morning as a single dose for 6 weeks. Co-trimoxazole (Trimethoprim 160 mg with sulphamethoxazole 800 mg) 8 hourly for first two weeks followed by 12 hourly for further 2 weeks may also be given. The combination of antibiotics used will vary based on disease severity, age and pregnancy.

In general, a full six-week course of antibiotics is recommended, and prompt treatment can lead to an improvement in symptoms and may also prevent the complications associated with brucellosis. However, relapse rates of the disease are still about 5%-10%, even with treatment. Depending on the severity of illness, the associated complications (if any) and the timing of treatment, recovery may take from a few weeks to a few months. Rarely, surgical intervention may be needed for certain complications associated with brucellosis, such as abscess formation or heart-valve infection.

### How it can be prevented?

The prevention of brucellosis can be achieved through various measures. The most important step in preventing brucellosis in humans begins with the control and eradication of the infection in animals who serve as a reservoir. This requires a coordinated effort between local public-health organizations and animal-disease-control entities. The most effective measures to achieve this objective include animal vaccination programs, animal testing, and the elimination of infected animals. There is no human vaccine currently available.

In areas where eradication of the disease may not be possible, preventive measures are aimed at reducing the risk of transmission to humans. These measures may include

- Maintenance of proper sanitization methods in animal farms;
- Pasteurization of dairy products;
- Avoiding the consumption of unpasteurized dairy products, including milk and cheese;
- Avoiding the consumption of undercooked meat;

- Using appropriate barrier precautions (goggles, gloves, masks, etc) to avoid exposure to aerosols and body fluids for those with an occupational risk for brucellosis;
- Warning laboratory workers about potentially infected specimens so that appropriate biosafety level III precautions can be taken.

In animals : Test and slaughter policy : Most effective for control of bovine brucellosis, however, due to ban on cattle slaughter in certain states of India, it has been replaced with test and segregation policy. The RBPT is recommended as a screen test and CFT as a confirmatory test. The reactors are removed at the earliest and slaughtered.

### Immunization

- (i) In Cattle - It can only reduce the prevalence of disease. The vaccines for animals include live attenuated - *B. abortus* S-19 and *B. melitensis* Rev-1. New vaccine strains which are currently under trial include *B. suis* strain 2 (for oral vaccination) and *B. abortus* RB 51.
- (ii) In Sheep and goat: The control measures are same as for cattle. In endemic areas, immunization with  $1 \times 10^9$  live organisms of *B. melitensis* Rev-1 by s/c route is most appropriate either as preliminary step to eradicate or as a sole measure to control the disease.
- (iii) In Pig and dog: No suitable vaccine is available presently, hence, control can be achieved through slaughter/euthanasia of positive animals besides application of general hygienic measures to check spread of the disease and use of *B. suis* strain 2 for vaccination.

#### Prepared by

**Dr. S. B. Barbuddhe**  
Senior Scientist  
(Veterinary Public Health)

**Dr. N. P. Singh**  
Director

#### Published by

**Dr. N. P. Singh**  
Director, ICAR Research Complex for Goa, Old Goa

#### For details, please contact

**Dr. N. P. Singh**  
Director  
ICAR Research Complex for Goa  
Old Goa 403 402, Goa  
Ph.: (0832) 2284678 / 79 • Email: director@icargoa.res.in / www.icargoa.res.in

**Secretarial Assistance: Mr. Sidharth Marathe**  
T-5 (PME Cell)

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# Brucellosis:

## An Important Occupational Hazard



**ICAR RESEARCH COMPLEX FOR GOA,**  
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)  
OLD GOA 403 402, NORTH GOA, GOA, INDIA

## What is brucellosis?

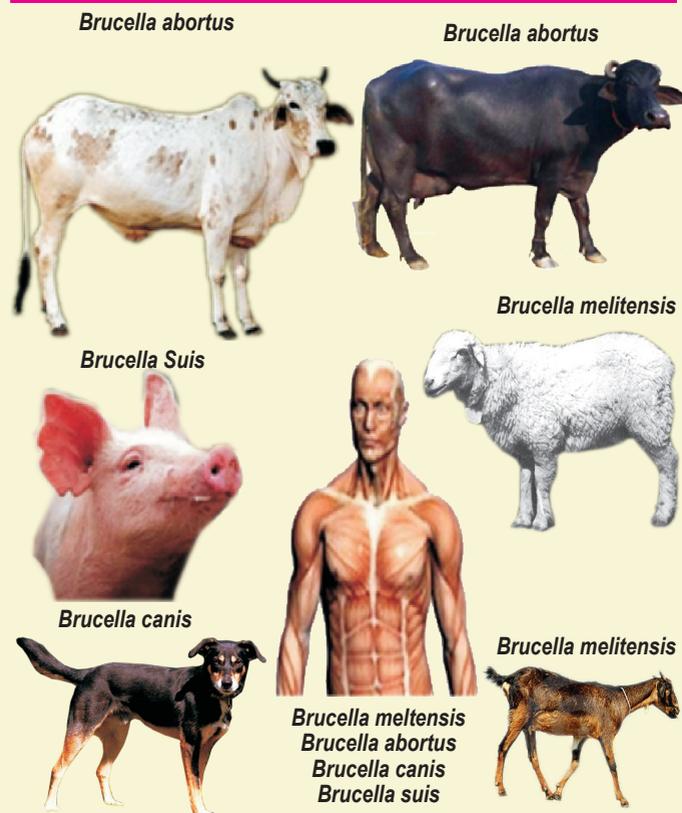
Brucellosis, also called Bang's disease, Crimean fever, Gibraltar fever, Malta fever, Mediterranean fever, rock fever, or undulant fever, is a highly contagious zoonosis caused by bacteria from the genus *Brucella* through ingestion of unpasteurized milk or meat from infected animals or close contact with their secretions. It is an infection that affects mainly animals, including goats, sheep, camels, pigs, elk, deer, cattle, and dogs. Humans develop brucellosis when they come in contact with contaminated animals or animal products.

## Who are at the risk?

Brucellosis is mainly an occupational disease because it is transmitted to humans in close contact with animals or animal products. The individuals at risk are-

- Slaughterhouse workers
- Animal Handlers
- Meat inspectors
- Veterinarians
- Laboratory personnel
- Hunters
- Travelers
- Consumers of unpasteurized dairy products

## Species susceptible to Brucellosis



## What are the symptoms of brucellosis?

### In animals

The most common clinical signs of cattle infected with *Brucella abortus* are high incidences of abortions, arthritic joints and retained placenta. In acute infections, the organism is present in most major body lymph nodes. In sexually mature animals the infection localizes in the reproductive system and typically produces placentitis followed by abortion in the pregnant female, usually during the last third of pregnancy, and epididymitis and orchitis in the male. Hygromas, usually involving leg joints, are a common manifestation of brucellosis in some tropical countries and may be the only obvious indicator of infection; the hygroma fluid is often infected with *Brucella*.

### In humans

Brucellosis can occur in humans that come in contact with infected aborted tissue or body fluids of animals. Brucellosis induces inconstant fevers, sweating, weakness, anemia, headaches, depression and muscular and bodily pain. The symptoms are like those associated with many other febrile diseases, but with emphasis on muscular pain and sweating. The duration of the disease can vary from a few weeks to many months or even years. In the first stage of the disease, septicaemia occurs and leads to the classic triad of undulant fever, sweating, migratory arthralgia and myalgia. Blood tests characteristically reveal leukopenia and anemia show some elevation of AST and ALT. If untreated, the disease can give origin to focalizations or become chronic. Orchitis is also frequent in men.

## How it is transmitted?

The bacteria are shed from an infected animal at or around the time of calving or abortion. Once exposed, the likelihood of an animal becoming infected is variable, depending on age, pregnancy status, and other intrinsic factors of the animal, as well as the amount of bacteria to which the animal was exposed. Transmission to animals occurs by ingestion of contaminated feed or body fluids, licking aborted fetuses, placentas, newborn offspring, vaginal discharges or contact with infected tissues or body fluids. Milkers can spread the infection through unsanitary milking practices.

Brucellosis is transmitted from animals to humans in several ways. The most common route of transmission occurs when humans consume raw milk or cheese from infected sheep and goats. Infected animals shed the organism into their milk, and if humans eat or drink unpasteurized dairy products from these affected animals, they can develop brucellosis. Brucellosis can

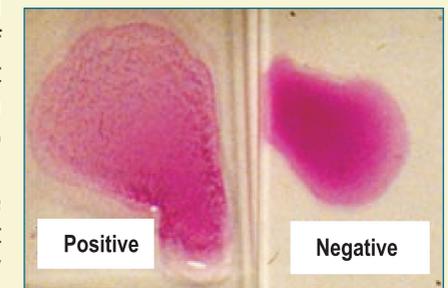
also be transmitted to humans via inhalation of the organism or by direct contact with infected animal secretions. The bacteria can gain entry into the body through the inhalation of aerosolized secretions, through breaks in the skin, or through exposure of the mucous membranes or conjunctiva from the splashing of infected secretions. An accidental injection with the livestock vaccine used against *Brucella abortus* can also lead to brucellosis in humans. Human-to-human transmission is very rare.

## How it is diagnosed?

Brucellosis is diagnosed in a laboratory by finding *Brucella* organisms in samples of blood, milk, bone marrow, aborted fetal tissue, placenta, vaginal secretions. Also, blood tests can be done to detect antibodies against the bacteria.

### • Serological tests

Rose Bengal Plate test (RBPT) and the complement fixation test (CFT) are the most widely used tests for the serological diagnosis of brucellosis. Indirect ELISA is also an accurate method to detect brucellosis. Standard tube Agglutination test (STAT) is widely used to determine antibody titer in patients. Herd Surveillance tests such as milk ring test (MRT) can be used 3-4 times a year on pooled milk samples to detect most infected herds.



### • Isolation of bacteria

*Brucella* can be isolated from different types of clinical specimens as well as from milk.

Selective media like Farrell's media and Modified Thayer Martin medium are useful for isolation. Enrichment is sometimes required. The incubation period is usually 1-3 weeks. Automated blood culture systems provide rapid way of isolating *Brucella* from samples.

### • DNA based assays

PCR assay has been shown to be a valuable method for detecting DNA from different sources and provides a promising option for diagnosis of brucellosis. PCR-RFLP and Southern-blot analysis have been employed to find DNA polymorphism to differentiate some *Brucella* species and biovars. PCR based on different molecular markers (16S rRNA, bscp31, IS 6501/711) are valuable method for detecting *Brucella* DNA.