



VPH-604
Zoonoses and Public Health
(Credit Hours-2+1)



BRUCELLOSIS



Brucellosis is a bacterial zoonotic disease caused by genus *Brucella* and the infection is almost invariably transmitted by direct or indirect contact with infected animals or their products

Man: also k/as

- Melitococcosis (*B. melitensis*)
- Malta fever (*B. melitensis*)
- Mediterranean fever (*B. melitensis*)
- Gibraltar Fever/ Undulant Fever (*B. abortus*)
- Cyprus Fever
- Rock of Gibraltar

Animals: also k/as

- Contagious abortion
- Abortus fever
- Infectious abortion
- Epizootic abortion
- Bang's disease (Cattle)
- Ram epididymitis (Male Sheep)

Etiology

Caused by genus- *Brucella*

- ✓ Gram negative
- ✓ Aerobic
- ✓ non-motile
- ✓ non-capsulated
- ✓ non-spore forming
- ✓ Coccobacillary rods
- ✓ Most species require 5-10% CO₂ for primary isolation



The common *Brucella* species include

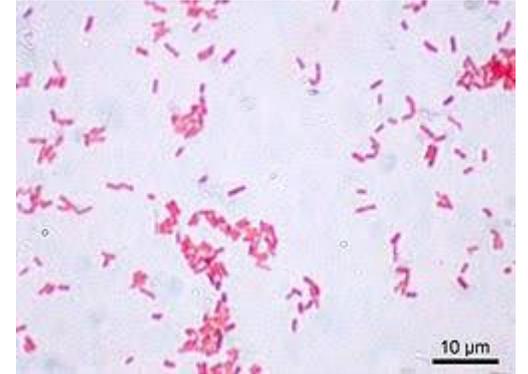
- ❖ *Brucella abortus*
- ❖ *B. melitensis*
- ❖ *B. suis*
- ❖ *B. canis*
- ❖ *B. ovis*
- ❖ *B. neotomae*

***B. neotomae* : nonzoonotic agents**

- **In 1863**
 - First described as Mediterranean remittent fever
- In **1887**
 - **Sir David Bruce** isolated *Brucella melitensis* from infected soldiers
- in **1897**
 - Danish veterinarian **Bernard Bang** isolated *Brucella abortus* (**Bang's disease**)

Epidemiology

- ❖ **Widely prevalent** : All the countries
- ❖ **In India**: widely prevalent in all the states
- ❖ **The occurrence of disease in man**: Indicator of the infection in **animals**



➤ *B. melitensis*

- **Most common** among all *Brucella* species
- Infections are primarily food borne (consumption of unpasteurized dairy products)

➤ *B. abortus*

- **Most widely distributed**
- Associated with occupational exposure
- *B. abortus* biotype I- Important in organized farms
- *B. abortus* biotype III- In cattle raised under the traditional system of rearing

➤ *B. suis*

- Associated with occupational exposure

➤ *B. canis*

- Human brucellosis due to *B. canis* is uncommon

- ❖ **The disease shows much higher prevalence in organized farms than in village herds**

Biotypes of *Brucella* spp.

Species	Biovars	Preferred natural host (s)	Other hosts	Pathogenicity for man
<i>B. abortus</i>	1-7 [#] , 9	cattle and other bovidae	sheep, buffalo goat, feral animal horse, camel	Moderate, cases usually sporadic
<i>B. melitensis</i>	1-3	sheep, goat	cattle, dog	High, cases can assume epidemic proportion
<i>B. suis</i>	1 & 3	swine	cattle, dog, horse	High
	2	swine, feral animals	cattle, dog, horse	Not reported
	4	feral animals (reindeer)		Moderate
	5	feral animals (murine and cricetine rodents)		High
<i>B. neotomae</i>	-	desert wood rat (<i>Neotoma lepida</i>)		Not reported
<i>B. ovis</i>	-	sheep		Not reported
<i>B. canis</i>	-	dog		Low, clinical cases rare.

[#]Biotype 8 does not exist now.

Epidemiology

Sl. No.	Species	Host
1	<i>B. melitensis</i>	Goats and sheep
2	<i>B. abortus</i>	Cattle
3	<i>B. canis</i>	Dog
4	<i>B. suis</i>	Pig
5	<i>B. ovis</i>	Sheep
6	<i>B. neotomae</i>	Desert Woodrat (<i>Neotoma lepida</i>)
7	<i>B. pinnipedialis</i>	Seal
8	<i>B. ceti</i>	Dolphin, porpoise, whale
9	<i>B. microti</i>	Common Vole (<i>Microtus arvalis</i>)
10	<i>B. inopinata</i>	Unknown

Sources and transmission

❖ In animals

The most common route is **through the mucous membrane** of **oropharynx, upper respiratory tract & conjunctiva**

• Cattle, sheep, Goats

- **Oral route** (by licking of aborted fetus or genital discharge of aborted dam)
- **Ingestion** of contaminated feed & water that are with aborted materials
- **Milk of infected dam** in the young ones
- **Artificial insemination** with frozen semen from infected bulls and dogs
- **Mechanical transmission** through flies, ticks, rats

• Swine

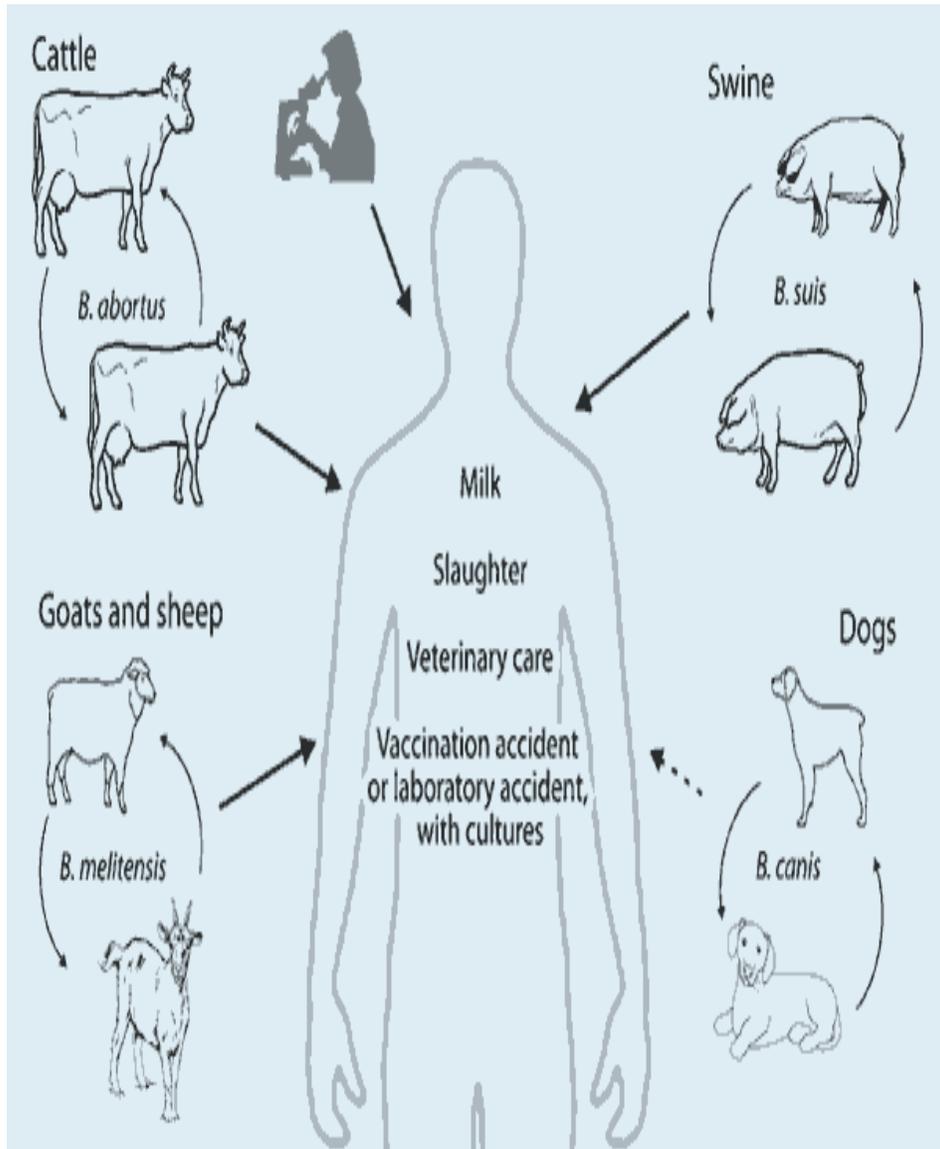
- **Venereal transmission** is an important route of infection in case of swine

• Dog

- Act as a **mechanical/ biological vector** for the transmission of *B. abortus*, *B. suis*, *B. melitensis* & *B. canis*



Sources and transmission

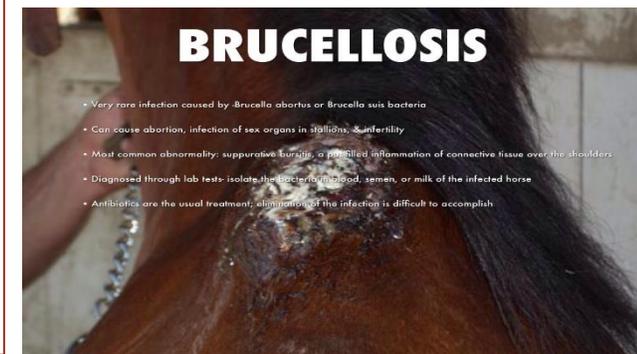


❖ In human

- ✓ **By the drinking** of infected raw milk or unpasteurized milk water contaminated with excreta of infected animals
- ✓ **By ingestion** of cheese, raw vegetables
- ✓ **Handling** of aborted fetus, fluids and fetal membranes
- ✓ **Occupational exposure** in stockyard workers, slaughter house workers and Veterinarian, butchers
- ✓ **Enter through** skin abrasions & conjunctiva and possibly airborne

Disease in Animal's

- The incubation period : **1 to 3 weeks** (rare instances several months)
- **In bovine, sheep and goats**
 - **Abortion** -late in gestation (3rd trimester) & only once
 - **In male sheep: *B. ovis* (Ram epididymitis)**
- **In swine: *B. suis***
 - localized in the non-gravid uterus
 - lead to abscess formation
 - lameness & posterior paralysis
- **In horse**
 - **Fistula of withers** & **poll evil** may be seen
- **Carrier state persists especially with secretions from the udder**
- **In male animals: Infertility, testicular abnormalities & poor semen quality**
 - **In Dog: Prostatitis, unilateral & bilateral testicular hypertrophy**



BRUCELLOSIS

- Very rare infection caused by *Brucella abortus* or *Brucella suis* bacteria
- Can cause abortion, infection of sex organs in stallions, & infertility
- Most common abnormality: suppurative bursitis, a purulent inflammation of connective tissue over the shoulders
- Diagnosed through lab tests- isolate the bacteria in blood, semen, or milk of the infected horse
- Antibiotics are the usual treatment; elimination of the infection is difficult to accomplish

Disease in Human

- The incubation period: **1 to 3 weeks**
- It is a septicemic disease with sudden or insidious onset and is accompanied by continued

Acute form

- ✓ Chills & profuse sweating
(Peculiar odour at night)
- ✓ **Weakness & fatigue**
- ✓ Normal temperature : In morning
- ✓ **Rise in temp:** In evening (40°C)
- ✓ Insomnia, nausea, headache, anorexia,
- ✓ Arthralgia, muscular/ body pain, wt. loss
- ✓ **Sexual impotence** & orchitis in males
- ✓ Lymphadenopathy
- ✓ **Neurological symptoms:** Irritation, nervousness & depression

Chronic form

- ✓ Undulant nature
- ✓ May persist for years
- ✓ (continuously or intermittently)
- ✓ Associated with hypersensitivity & it is very difficult to diagnose
- ✓ Case fatality < 2% if untreated
- ✓ Neurobrucellosis: 1-3% of cases
- ✓ **Sequelae are highly variable include:**
 - Granulomatous hepatitis, arthritis, spondylitis,
 - Anemia, leukopenia, thrombocytopenia,
 - Meningitis, uveitis, optic neuritis & endocarditis

Diagnosis

In animals:

1. Based on Sign & symptoms:

- *Abortions in the late pregnancy (third trimester)*

2. History:

- *Past infection*
- *Introduction of new animals*
- *Leads to storm of abortions*

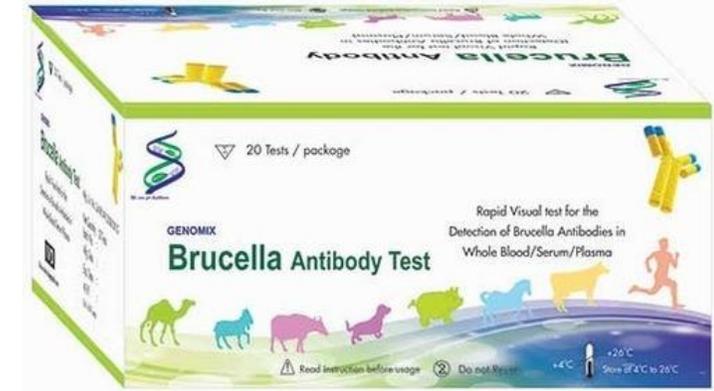
3. A confirmatory diagnosis

- *Isolation of brucellae*
(abomasal contents of aborted foetus/ uterine/ vaginal exudate)
- *Bacteriological culture*
- *Inoculation in guinea pig/ mice*

4. Immunodiagnosis

Detection of antibodies:

- *Serum/ Uterine discharge/ vaginal mucus/ milk/ semen plasma*



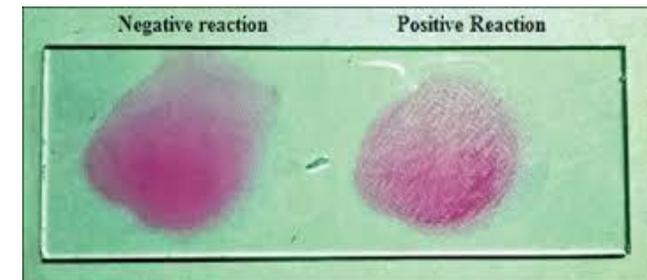
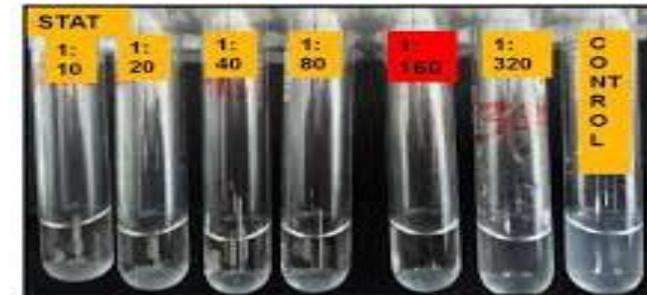
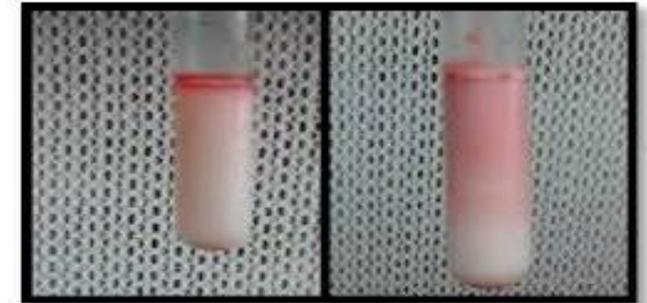
Diagnosis

- **In ovines & caprines**

- ❖ Skin Delayed Type Hypersensitivity test employing **brucellin** can be used for herd surveillance

- **In swines**

- ❖ The diagnosis of brucellosis presents special problem
- ❖ RBPT appears to be the most suitable test
- ❖ STAT gives variable results



Diagnosis

In man:

a. Tentative diagnosis

- ❖ *Based on epidemiological, clinical and laboratory finding*

b. The confirmatory diagnosis

- ❖ By isolation and identification

- ❖ **Most suitable specimen** : blood during high temperature

liver biopsy/ bone marrow aspirates from iliac crest/ sternum

c. In serology

- ❖ A paired serum sample
- ❖ STAT
- ❖ 2-mercaptoethanol test (**2-MET**)
- ❖ Coomb's or anti-globulin test (**AGT**) & **CFT**
- ❖ **STAT** is the most widely used test
- ❖ *Newer tests* **ELISA** Rapid & **sensitive PCR**



Treatment

- ***In animals:***

- Treatment for brucellosis is **neither advisable nor practicable**

- ***In man:***

- In the past, **tetracycline** (500 mg, 6 hourly for 6 weeks) + **streptomycin** (1.0 g, i/m, daily for 3 weeks)
- Presently, **rifampicin** (600-900 mg) + **doxycycline** (200 mg) to be given daily in the morning as a single dose for 6 weeks
- **Co-trimoxazole** (Trimethoprin 160 mg with sulphamethoxazole 800 mg) 8 hourly for first two weeks followed by 12 hourly for further 2 weeks may also be given

- **In pregnancy:** **Streptomycin & tetracycline** (Contraindicated)

Rifampicin & cotrimoxazole (Safe)

Prevention and control

❖ In Animals :

1. Test & slaughter policy/
2. Test & segregation policy (India)
3. Screening of disease: by RBPT & CFT
4. Cleaning & disinfection of farm
5. Vaccination:

Live-attenuated:

B. abortus S19

B. suis S2

B. melitensis Rev.1

B. melitensis M111

B. abortus RB51

Killed:

B. abortus 45/20

B. melitensis H38

❖ In Human :

1. Care during handling of infected animal
2. In Laboratory
3. Adapt hygienic measures
4. Educate people
5. Vaccination:

Live-attenuated:

B. abortus 19BA

B. melitensis 104M

Killed:

PI-SDS from *B. abortus* and *B. melitensis*

LPS-Protein conjugate

Acid extract