

Transmission: Direct contact, aerosol transmission, or mating are the ways in which the disease spread. Clinically recovered animals can have the virus for years.

Prevention and management: Infection can be controlled by using vaccine.

6. Bovine Viral Diarrhea (BVD)

BVD/ mucosal disease complex is a syndrome of bovines having reproductive and immunosuppressive effects. The disease is caused by BVD virus.

Symptoms: The infected animals usually have history of gastrointestinal disease (diarrhoea), however, if disease is mild, diarrhoea may go unnoticed and the first signs are likely to be abortion and birth of congenitally deformed (having birth defects) calves.

Transmission: It is transmitted by bull semen and carrier animals. Calves born that were infected with BVD during pregnancy may be persistently infected and are a significant source of infection to the herd.

Prevention and management: Disease can be controlled by constant screening and removal of persistently infected animals.

7. Chlamydiosis

Chlamydiosis is caused by zoonotic bacteria, *Chlamydia abortus*.

Symptoms: The disease causes abortion and infertility in bovines along with other reproductive issues such as endometritis, vaginitis and mastitis.

Transmission: *Chlamydia* can be shed and transmitted by almost all secretions and excretions (vaginal, ocular, and nasal fluids, semen and urine) with faecal shedding being the most important route. Infected animals can be a source of infection to humans which lead to severe outcomes including respiratory disorders and abortions.

Prevention and management: Antimicrobials, such as tetracyclines, macrolides (e.g. Erythromycin and Azithromycin), and Fluoroquinolones have shown good efficacy against Chlamydiae. The antimicrobial treatment is to be continued for several weeks after clinical resolution.

8. Mycoplasmosis

Mycoplasmosis, caused by *Mycoplasma bovis* is one of the important diseases of bovines of all ages. *M. bovis* is

often endemic (regularly present/ occurs within an area) in herds where it can circulate without being detected or without signs of clinical disease.

Symptoms: The disease can vary in severity, from no visible clinical signs to severe disease such as mastitis and abortions in dairy cows, arthritis in cows and calves and pneumonia in calves.

Transmission: Direct contact via nasal secretions of the infected animals and aerosols is the most common direct pathway, but infection can also be spread by a bull through infected semen. Indirect pathways include through food, water, colostrum, milk, shared farm equipment, milker's hands, equipment etc. Many stress factors such as immunosuppression, changes in environmental temperature, overcrowding, transport, poor air quality and poor nutrition have a role in causing asymptomatic carriers to become clinically ill.

Prevention and management: Potentially effective antibiotics include Tetracyclines, Aminoglycosides, Chloramphenicols, Macrolides and Fluoroquinolones. *M. bovis* is most likely to be introduced by an infected, carrier animal, so good biosecurity is essential to protect the herd.

General preventive measures for reproductive infections in the dairy farm:

- Farmers must regularly observe animals and practice good management practices such as isolating newly acquired animals for 30 to 60 days upon arrival and testing them for the reproductive infections before using for breeding.
- Farmers should purchase animals that originate from disease free herds.
- The farmers should breed their cows to bulls that have a record of good calving ease and no history of reproductive infections in the herd.
- Identifying aborting cows and isolating them from the rest of the herd helps to prevent the spread of infection.
- Keeping a reproductive history record of cows, including number of abortions, conception rate, and approximate breeding dates is crucial.
- Following aseptic procedures such as use of disposable gloves while handling aborted fetuses and associated tissues, or when examining the animal's

reproductive system is important to prevent zoonotic diseases.

- Ensuring adequate ventilation of sheds where animals are housed is important to prevent spread of infections.
- Regular cleaning and disinfection of the sheds and feeding equipment is crucial.
- Do not feed infected waste milk or colostrum from infected cows to calves.
- Reducing other stressors like overcrowding, mixing animals of different age groups.

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INFECTIOUS CAUSES OF BOVINE REPRODUCTIVE DISORDERS, THEIR PREVENTION AND MANAGEMENT



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INTRODUCTION

Reproductive diseases like infertility and abortions are the most financially damaging issues for any dairy farmer. The causes of bovine abortion can be infectious, endocrine (hormonal changes), physical, nutritional or toxicological. Infectious agents are the main causes of abortion in bovines and many of them are also zoonotic *i.e.* they can be transmitted to humans and cause human infections. Uterine infections are present in dairy cows most commonly during the period after calving since protective walls around the uterus are ruptured during and after birth, allowing pathogenic microbes to enter the cow's reproductive system. Infectious reproductive disorders in bovines usually appear gradually and are not identified until the disease has spread widely throughout the herd. Even while some animals never show disease signs, they pose a serious threat to the rest of the herd because they are invisible carriers of the infection. The most common external sign of reproductive infections in cow is the appearance of creamy white discharge from vulva. The most common reproductive infectious diseases in bovines include Brucellosis, Leptospirosis, Bovine Venereal Campylobacteriosis, Listeriosis, Infectious Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhea (BVD), Chlamydiosis, Mycoplasmosis and Trichomoniasis.

1. Brucellosis

The most serious infection of the bovine reproductive system is brucellosis. Brucellosis commonly infect cattle, but it can also affect pigs, sheep, goats, dogs, horses, and other animals, as well as humans. India has now started a nationwide Brucellosis Eradication Programme to eliminate the disease from livestock and human populations. Brucellosis poses a serious risk to veterinarians, animal handlers, butchers, livestock farmers, and researchers. It is caused by the bacteria



Fig 1: Bovine fetuses aborted in the last trimester (7-9 months).

Fig 2: Retention of placenta after abortion in infected cattle.

Brucella abortus. This microbe has more affinity for certain body tissues such as the udder, uterus, lymph nodes, testicles, and accessory sex glands.

Symptoms: Abortion usually in the last trimester or in advance stage of pregnancy is the typical sign of the disease because of preference of *Brucella* bacteria for the uterus (Fig 1). In addition there may be symptoms of retention of placenta, metritis, infertility, repeat breeding, reduction in milk yield and decreased weight and growth rate (Fig 2). Although infected cows rarely miscarry more than once, calves that were born later may be weak and sick. In bulls, epididymitis is the most noticeable clinical sign of this disease.

Transmission: Direct contact with the reproductive discharges from diseased animals during calving or abortion is the main source of brucellosis spread to the other animals and humans. A brucellosis affected cow during parturition produces a genital discharge in which millions of infective *Brucella* bacteria could be found on the surface of each calf, placenta, or vaginal discharge. In turn, the pasture, feed, etc., could become contaminated by the discharges which may continue to be infectious for a few days to a few weeks. Calves and humans can easily get infected through diseased cows' milk and colostrum. Artificial insemination with contaminated semen can also become a potential source of infection.

Prevention and management: Due to the risk of spread of the disease to humans (zoonotic), aseptic practices, such as the use of disposable gloves when performing gynaecological examinations or helping cows give birth, are strongly advised. It is advised to isolate all recently purchased cattle and test them for Brucellosis before adding them in the herd. Herds must be tested at regular intervals. Bulls occasionally become infected which is usually observed by a swollen testicle or scrotum. Semen from brucellosis infected bulls should be avoided for using in artificial insemination or natural service. For prevention of brucellosis, RB51 vaccine is used to vaccinate female calves between the ages of 4 to 12 month; about 6 months of age is best. For diagnosis of brucellosis, RBPT (Rose Bengal Plate Test) is the most common and simple blood test.

2. Leptospirosis

In India, leptospirosis is most prevalent in Southern states. It is a common issue, especially in dairy farms

having large number of rodents and dog population along with stagnant water in close proximity.

Symptoms: The illness frequently results in reproductive abnormalities like abortions (from 4 months to 9 months of pregnancy), stillbirths, infertility along with other symptoms like fever, jaundice, hemoglobinuria (red urine), and loss of milk production. Cattle that are confined closely are especially vulnerable.

Transmission: Leptospirosis can be spread from animal to animal or to human by direct contact with infected milk, urine, or placental fluids. The disease can also be transmitted by mating with infected animals or trans-placentally.

Prevention and management: Drain stagnant pools of water and vaccinate cattle. Rodents are possible reservoirs for the spread of leptospirosis, hence getting rid of rats and mice from any barns or sheds has been recommended for efficient leptospirosis control. Dogs should also be prevented to enter in farm premises. Acute leptospirosis can be controlled with the administration of high doses of Tetracycline, Oxytetracycline, Penicillin, Ceftiofur, Tilmicosin or Tulathromycin.

3. Bovine Venereal Campylobacteriosis

The bacteria *Campylobacter fetus venerealis*, which is found in the urogenital tracts of the bovines, is the cause of Campylobacteriosis.

Symptoms: Campylobacteriosis is a sexually transmitted illness that causes infertility, vaginitis (inflammation of the vagina), cervicitis (inflammation of the cervix), endometritis (inflammation of the endometrium/ uterine lining), early embryonic death, and sporadic abortions between four and seven months of pregnancy (Fig 3).



Fig 3: Bovine aborted fetus at first trimester (1-3 months) of pregnancy

Transmission: transmission of infection usually occurs during natural mating or during artificial insemination

using infected semen. Bulls may contract the disease via breeding with diseased cows. Infected bulls can carry the disease for a very long time if left untreated and could be a potential source of infection for healthy cow.

Prevention and management: The most feasible method of preventing *C. fetus venerealis* is vaccination and avoiding breeding with infected bulls.

4. Listeriosis

Listeriosis is a bacterial disease of bovines and other animals caused by *Listeria monocytogenes*. Infections are usually associated with feeding silage of low acidity.

Symptoms: *Listeria* infection causes septicaemia, encephalitis, meningoencephalitis, stillbirths, and abortion in cows. The abortions are most frequently detected in the last three months of pregnancy, usually in the absence of any clinical symptoms.

Transmission: *Listeriae* have frequently been isolated from animal faeces, as well as from a variety of animal sources, including meat and milk from cattle and buffaloes, in addition to being recovered from the environment.

Prevention and management: Infected animals should be culled since they excrete and release the bacteria, especially in cases of mastitis. Care must be taken when using and preparing silage because the pathogen thrives at a pH higher than 5, especially when fermentation is unsuccessful and moulds proliferate. Animals shouldn't be fed silage that is just a few inches from a clamp's front top and sides.

5. Infectious Bovine Rhinotracheitis (IBR)

IBR, often referred to as red nose disease, is a serious contagious herpes virus-1 (BoHV-1) disease of bovines.

Symptoms: There is a sudden onset of fever and anorexia, severe redness of the nasal mucosa (red nose), discharges from the nose and the eyes, conjunctivitis, increased salivation and a decrease in milk yield. Affected bovines have several raised lesions in the oral cavity progressing to blisters filled with pus. Abortion can occur between 4 to 9 months. Males may show balanoposthitis (inflammation of glans penis and prepuce) with similar pustular lesions on the penis. Temporary infertility may follow IBR because of vaginitis and/or a mild uterine infection.