



## **Overview of Veterinary Infectious Diseases**

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### **ABSTRACT**

*Veterinary infectious diseases are the factors that influence or alter the health of livestock, domestic animals, and wildlife. Because most diseases are transmitted from animal to human, animal diseases have both a direct and an indirect impact on the economy and medicine. The direct impact of these diseases on human health is causing illness. Indirectly, veterinary infections can disrupt food supplies or affect families' ability to access food. If the mortality rate in people is affected by cattle disease or illness, they are restricted from doing normal things, which has an indirect impact on a country's economy and necessitates medical treatment. Because tourists are discouraged from visiting the restricted areas, these diseases affect some areas or places that rely heavily on tourism. When discussing cattle, on which humans do indeed rely for food. Due to the spread of disease, there is a shortage of food supply, which eventually leads to a rise in the price of food, due to which poor people are not able to feed themselves.*

**Key words:** *Veterinary; disease; farmers; cattle; infection*

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### **INTRODUCTION**

Cattle play an important role in our lives as they provide us with meat, milk, and other dairy products, and we also get hides for making leather. It provides a maximum requirement for several activities of farming, like the waste residue of cattle that is also being utilized in farming lands. These are also useful for the transportation of several goods. But due to some diseases, the health of cattle is being affected, which is not only a threat to the cattle sector throughout the world but also has a huge impact on the market and livelihood. From an economic point of view, the illness and loss of life caused by various diseases decrease productivity and hurt a country's economy [1, 2]. This can also cause significant trade disruption and be a major source of concern for the country where exports are a major source of revenue for the cattle or livestock sector. Some of the cattle diseases are: -

#### **Bovine tuberculosis**

One of the chronic diseases found in cattle, i.e., bovine tuberculosis (a respiratory disease with rare clinical signs), represents one of the major threats for humans and directly impacts productivity. This disease is mainly caused by a bacterium, i.e., *Mycobacterium bovis*, which may have infected humans directly and has also been reported in other mammals, including dogs, pigs, cats, etc. This disease is reported all over the world, but some of the countries have not detected it, and a few of them have totally reduced or eliminated it from the cattle population. In general, a high prevalence rate of bovine tuberculosis is reported in Africa and some parts of Asia, but few cases are still reported in Europe. In literature, bovine tuberculosis is totally similar to human tuberculosis, and it may directly involve the lymph nodes, lungs, and digestive system organs. Initial symptoms of this disease are reported, i.e., chest pain, loss of appetite, cough, etc. This disease is contagious, slow to develop, and takes a long time to reach a fatal stage. In addition, transmission of disease occurs only through direct contact with any infected wild animal or through the ingestion of contaminated food material. Humans are also infected because of raw milk ingested from infected cows or contact with any infected tissues at butchereries. In contrast, this disease may be reported as chronic or subacute and show a different progression rate. Some of the animals may become severely infected in a few months, but some of them take several years to develop any clinical signs. In order to diagnose the disease, blood based tests were performed to detect the bacteria and determine the level of cell-mediated immunity (interferon gamma assay release) and antibodies. For confirmation of this disease, it is mainly diagnosed through bacterial culture and takes a lot of time for identification (at least 8 weeks)[3, 4].

**Theileriosis-** One of the genera (Theileria; phylum Apicomplexa) of parasites is totally related to Plasmodium. Two species of Theileria are reported (i.e., *T. annulata* and *T. parva*; acute disease and high mortality rate) as cattle parasites that cause tropical theileriosis and East Coast fever (symptoms, i.e., swelling of the lymph nodes and high mortality; reported in the southern part of Africa). This disease is a tick-borne disease, and a large number of Theileria spp. have been reported in tropical and subtropical regions. Some Theileria spp. are also reported in sheep (i.e., *T. uilenbergi* and *T. lestoquardi*), which showed a high mortality rate. These ticks may carry theileria and directly feed on cattle animals, so this parasite may directly go into the blood stream and enter the red blood cells. In the majority of cases, this parasite directly destroyed red blood cells, resulting in anaemia. Major symptoms of this disease are reported to be benign, with depression, anaemia, and lethargy being the most common, with some eventually leading to death. This disease is mainly diagnosed on the basis of clinical signs and by being able to detect the parasite microscopically in a lymph node (using Giemsa stain) by observing schizonts in infected white blood cells. In addition, another technique, i.e., the staining technique (blood smear), was also applied but was less sensitive with regard to detecting or finding out the piroplasms (rod-shaped or oval) in the carrier animals. In contrast, diagnosis of this disease is also done through an antigen-specific enzyme-linked immunosorbent assay or polymerase chain reaction on lymph node aspirates. One of the therapeutic drugs, i.e., buparvaquone, is available on the market, but it is expensive [5, 6].

**Trichomonosis-** Trichomonosis is a venereal disease of cattle that is mainly caused by *Tritrichomonas foetus* (a protozoan parasite; also called bovine trichomoniasis) and causes infertility through early embryonic death and abortion. So, these organisms are found in the cattle genital tracts, and their transmission will occur during mating. This disease is mostly spread on a smaller scale, and its transmission is mainly reported during mating, using contaminated equipment (e.g., syringes for calving), or using contaminated semen for artificial insemination. This disease was first reported in cattle (US; Philadelphia, Pennsylvania) in 1932. In contrast, bovine trichomonosis (*Tritrichomonas foetus*) is closely related to the human trichomonad protozoan (*Trichomonas vaginalis*). The diagnostic testing for this disease is only available in bulls, i.e., first, nonvirgin bulls (on the farm) should be tested prior to breeding season. For determining the parasite in bovine animals, real-time PCR is one of the most ideal tests for diagnosing and giving faster results when compared with culture-based ones with a higher confidence level in the results [7, 8].

**Trypanosomosis-** Trypanosomiasis, a flagellated protozoan disease (a unicellular, blood-borne infection), is normally found in cattle, especially in body and tissue fluids, and also affects a wide range of other hosts as well. The course of this disease is totally varied, and it's totally dependent on the host-parasite-vector relationship. The major symptoms of this disease are mainly reported, i.e., fever, anaemia, etc. The major vector, i.e., tsetse flies, for causing trypanosomiasis belongs to the category of Glossina species. Some of the species are found in different areas, i.e., *G. fusca* (dense forest zones), *G. morsitans* (savanna areas), *G. palpalis* (river and lake areas), etc.; these species may cause trypanosomosis in various mammals. As a result, these biting flies could be transferring blood from one animal to another and causing disease. In literature, five different species of Glossina are found in Ethiopia and can cause this disease at any moment [9, 10].

**Bovine anaplasmosis (Fig.1)-** Bovine anaplasmosis (infectious and non-contagious disease), is mainly caused by *Anaplasma marginale*. This disease is primarily transmitted through tick bites or the transfer of fresh blood from infected cattle to susceptible cattle, such as biting flies, or through blood-contaminated inanimate objects, such as ear tags, needles, castration equipment, and so on. This disease is mainly transmitted transplacentally and has been reported worldwide, especially in tropical and subtropical regions. In addition, this disease is reported in almost all age groups of cattle, and it may have intensified with age. Once an animal has been infected with *Anaplasma marginale*, the infection can last for the rest of its life. The diagnosis of this disease is mainly done through a blood smear in clinically infected animals, but this diagnosis is not reliable for detecting the infection in carrier animals. In addition, molecular techniques were used for detecting this disease. A lot of efforts were taken to control this disease, and it may have totally varied with geographical location, including the administration of antibiotics and vaccination [11, 12].

**Lumpy skin disease-** It is a highly contagious disease that is caused by a virus of the poxvirus family called the Neelheing virus. It is basically a lethal disease that mainly affects cattle and buffalo and is characterised by nodules or bumps on the skin as well as on other parts of the body. The disease causes relatively less mortality. It has been seen that it has no influence on humans. The seriousness of the disease can vary due to the breeds and differences in the strains of cattle. Because of the infection, cattle face several problems, including extreme emaciation and production loss for many months. Hides get damaged due to skin lesions. Fever, depression, skin nodules and oedema, enlarged lymph nodes, and leg swelling are among the symptoms. The signs are more radially seen in milking cows at the peak of

lactation and in young calves. In terms of origin, it was first discovered in Africa. It has also spread to countries in the Middle East, Asia, and Eastern Europe. Its prevalence is excessive in wet summer weather but may occur in winter as well. The disease has a significant economic impact due to the loss of production; as milk production is reduced, skin quality suffers; it also causes poor growth, infertility, abortion, and, in some cases, death. Recently, India has also faced a huge outbreak due to lumpy skin disease, resulting in the infection of around 2.4 million animals and the death of many cattle. It is transmitted by blood-feeding insects such as certain species of flies, mosquitoes, or ticks; it can also be transmitted by mosquitoes and, at times, from animal to animal. It is diagnosed by histopathology, virus isolation, or PCR. The disease might be better described as the less clinically salient pseudo-lump disease, which is caused by the herpes virus. Both the diseases can be differentiated by PCR. The poxvirus responsible for lumpy skin disease can be demonstrated by electron microscopy in early skin lesions. Treatment and prevention of lumpy skin disease in cattle cover the use of an attenuated virus, which may be helpful in controlling the spread. Administration of antibiotics to control secondary infections and good nursing care are suggested. However, a large number of affected animals in the herd refuse treatment [13, 14].

**Bovine viral diarrhoea-** It is a pestivirus infection caused by the bovine viral diarrhoea virus, which belongs to the family *Flaviviridae* and is a single-linear positive-stranded RNA virus. It is a viral disease of cattle and other ruminants. It is a common cause of respiratory and reproductive issues in herds. In most cases, infection in bulls reduces the quality of the sperm and isolates infectious viruses from the ejaculate, whereas in cows, it causes poor conception rates, abortions, and congenital defects. Infection symptoms include enteric and respiratory diseases, as well as reproductive and faecal disorders. The disease is most common in young cattle, aged 6 to 24 months. The disease does not specifically influence the digestive tract but instead has an immune-suppressive hallmark. The signs and symptoms may differ, depending on the infected animal's immune status and the strain that infects it. If infected with a virulent strain, non-vaccinated animals will experience a mild, serious illness with bloody diarrhoea, a high fever of around 105–107 degrees, off-feeding, and aphthous mouth ulcers (aphthae), as well as pneumonia in some cases. The animal may die as a result of a weakened immune system and a lack of proper health care, whereas other animals recover in less than a week or two. Bovine viral diarrhoea is a viral disease, so antibiotics are weak. When a pregnant animal recovers, she may abort two to four weeks after the infection is revealed, especially during the second trimester. Bovine viral diarrhoea is currently one of the costliest cattle diseases. Due to abortion, infertility, embryonic death, reduced milk production, etc., all these may lead to economic crises. It may spread through contact with a persistently infected animal. Other possible ways are through contact with contaminated fomites, including water buckets, calf feeders, and others. While there is no cure for this virus, clinical signs include necropsy findings and laboratory testing of a blood sample. Practicing supportive therapies such as increasing feed and water intake will help the cattle in the short term [15, 16].

## CONCLUSION

Veterinary disease in cattle is caused by different factors, due to which the health of our domestic animals and livestock gets affected. Every disease has its own characteristics, and different diseases have different pathogens, so the study of these diseases is important. The study of these diseases is required to learn about their pathogenicity, epidemiology, immune response, treatment, and prevention. If all of these diseases are ignored, they can endanger both animal and human life. It also has an impact on a country's economy in order to respond to and deal with all of these issues. Awareness and proper knowledge about these diseases are a must. Further investigation and research should be conducted on these issues so that these diseases do not become a major global concern in the future.

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