

Popular Article

Tick borne diseases of Cattle in India

C. Devamugilan, N. Devadevi, P. Vijayalakshmi, K. Rajkumar, A. Abiramy and V. Manimaran

Under graduate student (BVSc&AH), Assistant Professor, Department of Veterinary Medicine,
Professor and Head, Department of Veterinary Medicine, Professor, Department of Veterinary
Medicine

Professor and Head, Department of Veterinary Clinical Complex, Under graduate student
(BVSc&AH)

Veterinary Public Health Consultant, Vetcore Laboratories, Matuga, Mumbai-400019

Abstract

Ticks are the common ecto-parasites of cattle in tropical countries, high temperature and high humidity will favor the multiplication. Ticks found in the tropical countries are *Rhipicephalus haemaphysaloides*, *Haemaphysalis bispinosa* and *Hyalomma anatolicum anatolicum*. It transmits many haemoprotozoan diseases including theileriosis, babesiosis, anaplasmosis, ehrlichiosis and dermatitis. The objective of the articles is to describe the tick-borne disease, their clinical signs, treatment and preventive measures. Tick control measures, early diagnosis, right treatment and vaccination play a vital role in control of tick-borne diseases.

Keywords: Tick borne diseases, Cattle, India

Introduction

Ticks belong to the family Ixodidae (hard tick) and Argasid (soft tick), which have four stages of life cycle, namely egg, larva, nymph and adult. They suck blood from the host and undergo multiplication will cause severe anemia in animals. Saliva of ticks contain numerous proteins may lead to allergic reaction may result in dermatitis. Numerous blood protozoans undergo transformation in the gut of ticks and the saliva contains the infective for parasites. When the tick bite occur may inject the protozoan will produce disease in animals. Tick borne diseases are those haemoprotozoan diseases which are transmitted biologically through various species of ticks. Theileriosis, Babesiosis and Anaplasmosis are the most commonly reported tick-borne diseases in cattle. These diseases cause huge economic losses to the farmers due to decreased production, considerable mortality and cost on treatment of sick animals. Tick control is the effective means of preventing the spread of these diseases among the cattle population.

Theileriosis

Theileriosis is a tick-borne protozoan disease caused by *Theileria spp.*, which is characterized by swollen lymph nodes, elevated body temperature, varying degrees of leukopenia and anemia. The genus *Theileria* has mainly three species which infect cattle and water buffalo. They are pleomorphic in nature and occur as round, ovoid, rod or comma shaped in lymphocytes, histiocytes and erythrocytes in cattle. *Theileria parva* causes East coast Fever which is seen in most parts of Africa. Tropical theileriosis caused by *Theileria annulata* and Benign Theileriosis caused by *Theileria orientalis* are the most commonly seen theileriosis in India. *Theileria annulata* is transmitted by ixodid tick of the genus *Hyalomma* where as *Theileria orientalis* by the genus *Haemaphysalis* (Devadevi et.al 2018). The sporozoites are released from the salivary gland of the ticks into the vertebrate host during the bite of the tick. They occur as schizonts in the lymphocytes of the local lymph nodes and piroplasm in the erythrocytes. In theileriosis, there will be marked fever, swelling of the lymph nodes, inappetance to anorexia, reduced milk yield, anemia, dyspnea, tachycardia, labored breathing, serous nasal discharge, coughing, restlessness, pale mucous membrane and icterus. In some cases, there may be diarrhea, weight loss, convulsions and torticollis may be seen. Theileriosis can be diagnosed based on the clinical signs, examination of peripheral blood smear and lymph node biopsy which reveal the presence of piroplasm in erythrocytes and schizonts in lymphocytes which is known as Koch blue bodies. ELISA test provide higher sensitivity and specificity than IFAT. Carriers can be detected by PCR (Devadevi et. al. 2018). In necropsy, there will be punched necrotic ulcers in abomasum.

Buparvaquone at the dose rate of 2.5 mg/kg, intramuscularly is most effective against Theileriosis (Devadevi et. al. 2018). Tetracycline at the dose rate of 10 mg/kg, intravenously for 3 to 5 days is effective against the schizogony stage of the organism. Diminazene aceturate at 2.5 to 5.0 mg/kg, deep I/M is effective but doubtful against the erythrocytic stage. Halofuginone at 1.2 mg/kg is also effective but toxic in nature. Tick control by the use of acaricides is the best way to control theileriosis. Rakshavac-T is the prophylactic vaccine available against the Theileriosis caused by *T. annulata*. It can be administered at the dose of 3ml, subcutaneously at 2 months of age and can be repeated every 3 years once.

Babesiosis

Babesiosis is a tickborne protozoan disease caused by *Babesia spp.*, which is characterized by high fever, anemia, jaundice and haemoglobinuria. In cattle, there are four species of *Babesia* which includes *Babesia bigemina*, *Babesia bovis*, *Babesia divergens* and *Babesia major*. *Babesia bigemina* and *Babesia bovis* are the important species found in tropical and subtropical regions in the world. They are intra-erythrocytic parasite which is transmitted by ixodid tick of the genus *Rhipicephalus*.

Clinical signs include high fever, inappetance, dark red to brown colour urine, anemia, depression, decrease in milk yield, jaundice, diarrhea followed by constipation and emaciation. Death may occur due to unabated destruction of red blood cells because of autoimmune mechanism, failure to recoup blood loss, cerebral anoxia (Bhatia *et. al.* 2018). Diagnosis is based on the Clinical signs, detection of piroplasms in the peripheral blood smear and serological tests such as Complement Fixation Test, Immunofluorescence antibody test, competitive ELISA. PCR is the best method to detect the organism.

Imidocarb dipropionate at the dose rate of 1 to 2 mg/kg subcutaneous or intramuscular is most effective against babesiosis which completely eliminates the parasite from the host. Diminazene aceturate at 3.5 to 5.0 mg/kg deep I/M can also be used. Symptomatic treatment should be accompanied to reduce the fever and anemia by use of appropriate antipyretics and B-complex injections or even blood transfusions in severe cases. Babesiosis can be prevented by control of ticks with acaricides and vaccination by either killed vaccine or live attenuated tissue culture vaccine.

Anaplasmosis

Anaplasmosis in cattle is caused by the genus *Anaplasma* which includes *A. marginale* and *A. centrale*. They are obligate intraerythrocytic parasites of the order Rickettsiales. Adult cattle are more susceptible to infection than younger calves. The organism is transmitted biologically by ixodid ticks of the genus *Boophilus*, *Dermacentor*, *Hyalomma* and *Rhipicephalus* and transmitted mechanically by biting flies of the family Tabanidae. The organism can also transmit through blood contaminated fomites. The organism infect the mature erythrocytes and causes continuous destruction of erythrocytes which lead to mild to severe anemia and icterus without the development of hemoglobinemia and hemoglobinuria. There will be mild fever which develop slowly, inappetance to anorexia, fall in milk yield, pale to icteric mucous membrane and emaciation. However, in peracute cases, there will be sudden onset of high fever, severe dyspnea and death usually within 24 hours. Diagnosis is based on the clinical signs and examination of blood smears for the detection of organisms. Serological tests such as Complement Fixation Test, Capillary tube agglutination test and Fluorescent antibody tests can be used to diagnosis the disease.

Oxytetracycline at the dose rate of 6 to 10 mg/kg intravenously for three days or a long acting oxytetracycline at the dose rate of 20 mg/kg as a single injection is effective against Anaplasmosis. Imidocarb and Diminazene aceturate can also be used. Supportive treatment with blood transfusions is indicated in case of severe anemia. The prevention of anaplasmosis can be achieved effectively by the use of acaricides to control the tick infestation. Vaccination can also be done as a control measure of Anaplasmosis.

Conclusion

Tick borne diseases are the major problem in livestock rearing which have a greater impact on the economy of the farmers. These diseases can be prevented by control of ticks, treatment of the infected animals, vaccination and chemoprophylaxis. However, there is no completely effective vaccines are currently available for any of these diseases (Isabel et. al. 2012). Researches may be able to provide effective vaccines in future to limit these diseases and thereby helps in improving the economy of the livestock farming.

References

- B.B.Bhatia, K.M.L.Pathak, P.D.Juyal, 2018. Text book of Veterinary Parasitology, Kalyani Publishers, Fourth revised edition, pp 461-482.
- Isabel Marcelino, Andre Martinho de Almeida, Miguel Ventosa, Ludovic Pruneau, Damien F. Meyer, Dominique Martinez, Thierry Lefrancois, Nathalie Vachery, Ana Varela Coelho, 2012. Tick-borne diseases in cattle: Applications of proteomics to develop new generation vaccines. *J Prot*, doi : 10.1016/j.jprot.2012.03.026.
- Devadevi N, Rajkumar K, Vijayalakshmi P and Sreekrishnan R. 2018. Occurrence of ticks in bovine benign theileriosis in cattle of puducherry region. *Journal of Entomology and Zoology Studies*. 6(4): 72-73.
- Devadevi N, Rajkumar K and Vijaylakshmi P. 2018. Efficacy of buparavaquone in the treatment of bovine benign theileriosis. *International Journal of Chemical Studies*. 6(3): 3110-3112.
- Devadevi, N, Rajkumar, K, Vijayalakshmi, P. and Venkatesa Perumal, S. 2018. Molecular Studies on Bovine Benign Theileriosis (*Theileria orientalis*) in Cattle of Puducherry Region. *Journal of Animal Research*; 8(3): 393-397.