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Transmission of Theileriosis in Cattle

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ABSTRACT

Theileriosis comprises a cluster of tick-borne illnesses instigated by protozoan parasites belonging to the genus Theileria. Numerous Theileria species are prevalent among both livestock and feral cattle in equatorial and semitropical areas worldwide. Among these, some pose significant threats to cattle, inducing acute ailments with elevated mortality rates. Some are notable contributors to mortality in sheep. Although a therapeutic drug called buparvaquone exists for treatment, its high cost necessitates alternative disease control measures such as preventing tick infestations or, in certain regions, resorting to vaccination.

Introduction:

Sporozoites injected by ticks are the infective stage in Theileria infection, targeting host leukocytes. Following entry, sporozoites transform into multinucleate schizonts, inducing host cell proliferation[1]. Casein kinase II may be involved in signaling this. Schizonts divide synchronously during host cell division, leading to clonal expansion. Some schizonts undergo merogony, producing merozoites that invade erythrocytes, developing into piroplasm [2].

Life-Cycle

Theileria is transmitted by ticks. Sporozoites enter the host's mononuclear cells, developing into trophozoites and multinucleate schizonts through asexual reproduction. This prompts host cell proliferation, facilitating parasite multiplication. Initial infection occurs in local lymph nodes, with schizont dissemination through lymphoid tissues [3]. Merozoites, formed from schizont differentiation, enter erythrocytes, creating infective piroplasm for ticks. Sexual reproduction transpires in tick nymph and larval stages, culminating in an infective stage within salivary glands, subsequently transmitted to mammals during blood-feeding, demonstrating trans-stadial transmission in ticks [4].

Transmission

The investigation into the transstadial transmission of Theileria involved the use of various tick species, including *Hyalomma* (*H.*) *dromedarii*, *Haemaphysalis bispinosa*, *Rhipicephalus haemaphysaloides*, and *Boophilus microplus*. *H. anatolicum* effectively propagated the infection from the larval stage to the nymph stage and further to the adult stage in all instances. Adult ticks, having acquired the infection during their feeding on a calf, were able to transmit the infection to another calf within the initial 24 hours of feeding.

Similarly, *H. dromedarii* also displayed successful transmission from the larval stage to the nymph stage and subsequently to the adult stage [5].

H. marginatum isaaci transmitted the infection from the nymph stage to the adult stage, whereas *Haemaphysalis bispinosa*, *Rhipicephalus haemaphysaloides*, and *Boophilus microplus* did not facilitate the transmission of *T. annulata* from the larval stage to the nymph stage and subsequently to the adult stage.

Regarding *T. parva*, sporozoites are introduced into cows during feeding by infected ticks, specifically *Rhipicephalus appendiculatus*. The ticks acquire and spread the disease by feeding on cows or buffaloes carrying the infection without displaying any disease symptoms. Both cow- and buffalo-derived T parasites pose significant harm to cows [6].

Signs and Symptoms of Theileriosis

Disease symptoms associated with benign theileriosis caused by hemoparasites follow a distinct pattern. Common clinical signs include fever, lymph node enlargement, lacrimation, anemia, rapid breathing, depression, and, in many cases, fatal outcomes. Pregnant cows can experience abortion yet still successfully give birth [7].

Treatment

Buparvaquone, frequently combined with antibiotics, and anti-inflammatory medications, stands as the sole treatment option for illnesses induced by Theileria parasites. Administering treatment early in the clinical disease phase proves effective, although multiple doses may be necessary. However, its efficacy diminishes in advanced stages marked by substantial damage to lymphoid and hematopoietic tissues [8].

Control

The predominant approach for preventing theileriosis involves the regular application of acaricides through animal spraying or dipping. This method requires consistent intervals to maintain effectiveness. Pyrethroid compounds are commonly employed in areas where animals face challenges from both tick-borne diseases and trypanosomes. In certain countries, attenuated vaccines utilizing in artificial cultured parasitized bovine cells carrying the schizont stage of Theileria are utilized to vaccinate cattle against this particular species. It is recommended to administer cattle vaccinations 3-4 weeks before allowing them access to infected pastures [9].

Conclusion

Upon clinical examination, a lackluster appearance of the hair coat was observed, accompanied by a few petechial hemorrhages on the conjunctival mucous membrane. Clear nasal and ocular discharges were noted, and lymph nodes displayed normal size and consistency, aligning with previous findings. The customary incubation period for *T. annulata* infection ranges from seven to twenty-four days, with symptoms manifesting approximately a week after the tick bite. However, in this study, calves exhibited clinical signs of bovine theileriosis within 72 hours of birth, indicating limited transmission possibilities through tick bites for *T. annulata*.

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