

Are *Treponema spp.* coinfections necessary to develop Digital Dermatitis lesions in cattle?

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Digital dermatitis is a leading cause of infectious lameness in Alberta dairy cattle and although the etiological agent has not yet been identified, multiples species of the genus *Treponema* are consistently found in DD lesions during initiation and progression. In addition, lower treponemal diversity is found in subclinical and chronic DD cases compared to clinical DD cases.

At the University of Calgary, we are testing the hypothesis that treponemes cause skin lesions when there are synergistic interactions among various species and full pathogenicity is achieved only when complementary virulence factors are produced. Currently, we are examining the nature of this synergy on pathogenicity in a murine model. To test our hypothesis, we have selected four of the most frequent *Treponema spp.* present in different stages of bovine Digital Dermatitis cases within Alberta farms.

In the murine model, we will test all possible *Treponema* infection combinations and the obtained results will be validated in an experimental infection model in cows.

Preliminary result of the pilot experiments carried out in a total of 72 mice showed that animals subcutaneously challenged with 10^9 *Treponema* develop an abscess in 93% of the animals within the first seven days. Single *Treponema* species produced an abscess with a mean size of 190mm^3 , whereas treponema mixture caused an abscess with a mean size of 601mm^3 . *Treponema spp.* has been cultured from 85% of the mice at 7 days and from 75% of animals at 14 days, indicating that despite the abscess development, *Treponema* are able to survive in mice skin lesions.

A better understanding of the role of individual and mixed *Treponema* species in pathogenesis will facilitate the development of new methods to prevent and control DD in Canadian dairies.