

Resolving the polybacterial characteristics of digital dermatitis lesions in cattle

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Digital dermatitis (DD) is a painful chronic infection often found in cattle on the bulb of the heel. As one of the most significant causes of lameness in dairy cattle, DD poses significant industry challenges for profitability and animal welfare. The causative agent and pathogenesis of DD is not well understood, as previous research focuses on *Treponema* spp. as the primary pathogen; however, recently the role of additional anaerobic bacteria in DD disease dynamics is being proposed. Our project aims to identify the important anaerobic pathogens associated with DD, and monitor the differences in these bacterial quantities between DD lesion stage. We are currently looking at beef animals to study DD-associated pathogens that are well described in other foot diseases such as the foot rot bacteria *Fusobacterium necrophorum* and *Dichelobacter nodosus*. Bacterial populations will be monitored in all DD lesion stages through DNA sequencing, and by developing a novel quantitative PCR (qPCR) which will quantify the DNA of multiple non-*Treponema* anaerobic pathogens such as *Fusobacterium necrophorum* from DD samples. In addition, we will optimize culture methods for DD-associated anaerobic pathogens to allow us to better study their roles in DD. These strategies are essential to understanding the pathogenesis of DD as a polybacterial infection, and will increase our understanding of the interactions between anaerobic pathogens within DD lesions. Our qPCR targeting non-*Treponema* anaerobic pathogens will complement a *Treponema* species-specific qPCR previously developed in our lab; together these tools will be fundamental to studying significant pathogens within DD lesions in relation to disease initiation and progression.

Implications: Current treatments for DD fail to completely eliminate lesions and cannot prevent recurrent infections. Results generated from this study will help elucidate DD disease dynamics in cattle, potentially identifying better strategies for treatment and prevention.