

Assessment of a commercial borescope to evaluate the presence of lesions of digital dermatitis in dairy cows

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Introduction

Digital dermatitis (DD) is a worldwide infectious disease of cattle with high prevalence in dairy herds. It is a painful disease with welfare issues causing economical losses. Identifying the affected animals is crucial to establish early treatment and evaluate the efficacy of a control strategy. The “gold standard” diagnosis of DD is the direct observation of DD lesions in a trimming chute. However, the use of a trimming chute for daily diagnosis of DD in all cows is not possible. To facilitate DD monitoring between trimming sessions, lesions could be identified in the parlor during milking. Therefore, we evaluated the use of a commercial borescope in a rotary milking parlor. Our hypothesis was that a borescope is an adequate alternative to evaluate DD lesions between trimming sessions. Our objective was to assess the sensitivity (Se), specificity (Sp), positive predictive value (PPV), and negative predictive value (NPV) of a borescope for the diagnosis of DD in the milking parlor as compared to direct observation in a trimming chute, and to quantify the agreement between both techniques.

Materials and Methods

A cross-sectional study was conducted on a 250-cow free-stall dairy farm. The unit of interest was the hind foot and observations were limited to lactating cows. We used a borescope (WF200 WiFi Endoscope, Teslong) wirelessly connected to an electronic tablet (iPad, Apple). Lighting was provided by integrated LEDs. Assessment of the plantar aspect of the hind feet for lesions was made by 2 observers. Feet were not washed before examination. All observation at the trimming chute was made within 48 to 72 hours after milking parlor evaluation by 1 of the observers. DD lesions were scored using a modified Dopfer classification: M0 (skin without sign of DD), M1 (ulcerative reddish lesion less than 2 cm of diameter), M2 (ulcerative red-to-gray lesion more than 2 cm of the diameter), M3 (healing lesions, with a blackish scab), M4 (chronic proliferative gray lesion), and M4.1 (chronic proliferative lesion with an ulcerative reddish lesion). Se, Sp, PPV, and NPV were computed using 2 strategies. First,

we evaluated the ability of each diagnostic method to detect a lesion of DD (M1, M2, M3, M4, and M4.1) vs no lesions of DD (M0). Secondly, we evaluated their ability to distinguish between active lesions (M1, M2, and M4.1) vs inactive lesions (M0, M3, M4). The overall agreement between DD lesions scored by borescope and during trimming session was computed using weighted kappa (WK). The interobserver agreement was also computed with Cohen’s kappa.

Results

A total of 870 hind feet were scored in the milking parlor and during trimming. The overall prevalence of DD was 26.4% using the borescope and 30.7% at trimming. The Se for detecting any DD lesions using the borescope was 64% (95% CI: 57%-69%), Sp was 91% (95% CI: 88%-93%), PPV value was 78%, and NPV value was 83.5%. When the lesions of the DD were dichotomized in active vs inactive lesions, the Se of observation with borescope was 39% (95% CI: 32%-45%), Sp was 99% (95% CI: 98%-99%), PPV value was 97%, and NPV was 81%. The WK was 0.45 (95% CI: 0.39-0.50) and was classified as moderate level of agreement between the 2 techniques. The interobserver agreement was 0.88 which is considered “very good”.

Significance

The use of a borescope was shown to have a moderate ability to detect DD lesions and a low ability to differentiate between the infectious stages of the condition. The low sensitivity of the borescope to detect DD lesions means that this technique presents an increased risk of false negative results causing an underestimation of the true prevalence and possibly delays in treating active lesions of DD. The moderate agreement between scoring with borescope and observation in trimming chute means that a high risk of lesion misclassifications exists with the borescope. Diagnosis of the DD lesions in realistic daily condition remains challenging and other detection methods must be investigated.