

Digital dermatitis affects locomotion and gait traits of beef cattle in feedlots

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Introduction

Sparse scientific evidence of cattle in confined environments, like feedlot dirt pens, report on increased importance of digital dermatitis (DD) besides foot rot as an infectious cause of lameness. Therefore, we investigated the associations between DD presence and locomotion, gait traits, feet and leg conformation, and hygiene related risk factors in feedlot cattle to provide the industry with clear guidelines on identification of DD affected cattle.

Materials and methods

Cattle ($n = 310$) from 13 pens in 3 feedlots were videotaped, enabling locomotion scores (LS) and gait trait scores (GS). Cattle were restrained in a chute, where each hind foot was videotaped, confirmation scored, lifted, and inspected for presence of foot lesions. Cumulative odds logistic regression models determined associations between DD, LS and GS.

Results

In total, 104 cattle had DD (69 and 35 with active and chronic lesions, respectively). Odds ratios for cattle with DD being lame or moderately to severely (M-S) lame was 8.0 ($P < 0.001$) and 10.1 ($P < 0.001$), respectively, compared to No-DD. Cattle with active lesions had OR 9.4 ($P < 0.001$) and OR 14.9 ($P < 0.001$) for being lame or M-S lame. Likewise, cattle with chronic lesions had OR 6.4 ($P < 0.001$) and OR 5.5 ($P = 0.002$) for being lame or M-S lame. Asymmetric gait (AG), and reluctance to bear weight (WB) had the greatest OR for classifying cattle with DD: OR 5.5 ($P < 0.001$) and OR 5.8 ($P < 0.001$) or having severely altered gait (OR 8.2; $P < 0.001$ and OR 17.9; $P < 0.001$).

All gait traits had low Se for detecting cattle with DD and varied from 6.7 to 34.6% with LS (Se 34.6%; PPV 76.6%) and AG (Se 25.0%; PPV 74.3%) being most associated. All traits had high Sp, ranging from 94.1% (NPV 72.1%) for LS to 98.4% (NPV 68.9%) for WB. Foot and leg conformation did not affect DD disease status; however, hygiene scores (i.e., pen muddiness) increased the odds of DD (OR = 8.55, CI: 4.0-18.4), as did pens with “excessive mud” (OR = 14.1, CI: 5.9-33.8). Pens with “more mud than bedding” and “excessive mud” also significantly decreased ADG, -0.14 and -0.38 kg/d, $P < 0.05$, respectively.

Significance

LS remained the best tool to detect cattle with DD, whereas traits like WB and AG had the strongest associations with DD presence. Pens with poor hygiene status were more likely to house DD affected cattle. Crew training focused on LS and more specifically WB and AG will assist in identifying DD affected cattle that need treatment. Due to low Se and relatively low PPV, training and thorough evaluation should be prioritized to avoid financial impact of infectious lameness in feedlot environments.

