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## EVALUATION OF CAMERA-BASED DAIRY CATTLE LAMENESS DETECTION TECHNOLOGY PAIRED WITH ARTIFICIAL INTELLIGENCE

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Evaluation of camera-based dairy cattle lameness detection technology paired with artificial intelligence

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The aim of this study was to explore whether autonomous camera-based (AUTO) mobility scores could detect first lameness occurrence earlier in cows, by assessing the association between average weekly autonomous camera-based (AUTO) mobility scores and cows with a lesion for the first time. The AUTO scores data were collected from 2,982 cows in a single farm from April to December 2022, including cow id, mobility score (0 - 100), and observation date and time. Historical farm hoof lesion data were collected from 2,204 cows and used to determine cow lesion history and date of lesion diagnosis (LD). To remove the confounding impact of chronicity, the study focused on cows with no history of lameness and categorized them into two categories: those with a first-time LD (LESION) and those seen by a hoof trimmer without an LD (TRIM). These categories were compared based on when the trimming occurred: within seven days of dry off (DOT) or at random time based on farm staff observation. Individual AUTO scores were summarized into moving average weekly scores. All weekly AUTO scores were reported as median [IQR]. Comparisons were made for the LESION cows by lesion types. The lesion types for DOT (n = 60) were 93% TRIM, 3.3% toe ulcer (TOE), 1.7% white line disease (WLD), and 1.7% sole ulcer (SU). For RT (n = 239), 63% were TRIM, 17% digital dermatitis (DD), 7.5% SU, 7.1% WLD, 4.2% foot rot (FR), and 4.2% TOE. Four weeks prior to RT, LESION had a similar median score (37.6 [18.3]) to TRIM (38.5 [13.7]). One week prior to RT, LESION had a higher median score (41.1 [17.5]) compared to TRIM (39.2 [15.5]). For DOT, four weeks prior, LESION had a higher median score (59.2 [2.1]) than TRIM (40.0 [9.9]), and this pattern persisted through 1 week prior. FR had the highest score (47.3 [22.9]) four weeks earlier, followed by SU (42.8 [19.0]), WLD (41.2 [13.5]), and DD (35.0 [14.1]). One week prior, these scores were increased for FR (57.1 [11.5]), SU (44.5 [12.4]), WLD (44.3 [26.8]), and DD (39.5 [10.6]). The results suggest that AUTO scores may have the potential to detect some lesions earlier. However, there is variation between cows and weeks that presents a challenge yet to be addressed.