

Evaluation of Techniques for Diagnosis of Endometritis in Dairy Cows

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Introduction

Endometritis in postpartum dairy cows has been shown to decrease reproductive performance. Endometritis has been classified as clinical (CE; visible purulent discharge on vaginal examination or by measurement of cervical diameter) or subclinical (SCE; inflammation measured with endometrial cytology). Various techniques have been proposed for their diagnosis, including the MetrichexTM (MTCK) device (Simcrotech, New Zealand) and measuring cervical diameter (CERV) by rectal palpation for diagnosing CE, and the cytobrush technique (CYBR) for SCE. It has been assumed that cows with CE are a more severe or evident subset of cows with SCE but little is known about the relationship of CE to SCE. The objectives of this study were to compare the findings of vaginal discharge and cervical diameter with endometrial cytology and to assess the relationship between these results and subsequent reproductive performance.

Materials and Methods

Lactating Holstein cows ($n = 2,490$) from seven commercial dairy farms were enrolled in this trial. All cows were examined for SCE and CE once between 32 and 38 days-in-milk (DIM) using CYBR, MTCK, and CERV. Cows were classified as having SCE if there was $\geq 8\%$ neutrophils in the endometrial smear. Results from MTCK were classified as positive if score was ≥ 2 (MTCK2; mucus with flakes of pus) or ≥ 3 (MTCK3; muco-purulent). Results from CERV were classified as positive if ≥ 3 inches (7.5 cm). The reproduction outcomes were the probability of pregnancy at first service (CFB) and by 150 DIM (P150). Statistical analyses were conducted in SAS using SCE, CFB, and P150 as outcomes. All models accounted for the effects of herd and season.

Results

The prevalence (%) of SCE, MTCK2, MTCK3, CERV was 18, 35, 13, and 5, respectively. The sensitivity (%) and specificity (%) of CE diagnosis techniques compared to SCE were: MTCK2, 58, 64; MTCK3, 34, 89; CERV, 11, 96, respectively. The positive and negative predictive values (%) were highest for MTCK3 (39.9 and 86.1) and CERV (38.6 and 83.1). Agreement between techniques used for CE and SCE was slight to fair (Kappa = 0.10 to 0.24). Combination of results from MTCK3 and CERV did not improve predictive values or agreement. Among cows positive for MTCK3, only 40% were positive for SCE. Cows affected by SCE were less likely to be pregnant at 150 DIM (odds ratio (OR) = 0.6; 95% confidence interval (CI) = 0.4 to 0.9; $P = 0.02$). Cows affected by CE defined as MTCK3 were less likely to be diagnosed pregnant to first breeding (OR = 0.7; 95% CI = 0.4 to 0.9; $P = 0.02$) and to be pregnant at 150 DIM (OR = 0.5; 95% CI = 0.3 - 0.7; $P = 0.02$). CERV was not associated with pregnancy at first AI or by 150 DIM.

Significance

These data suggested that using the cow-side tests MTCK3 and CERV provided relatively accurate results when a negative diagnosis was obtained but, not surprisingly, they did not identify a large proportion of cases of SCE. Interestingly, a novel finding was the proportion of cows with pus in the vagina (CE) that did not have cytologic evidence of endometrial inflammation (SCE). The determinants of the occurrence and form(s) of expression of endometritis merit further investigation. Nonetheless, these data confirmed that SCE and CE are common and have substantial negative associations with reproductive performance.