Leukocyte esterase test for diagnosis of endometritis in dairy cows

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Endometritis is a common inflammatory uterine disease that persists beyond normal uterine involution and impairs reproductive performance. Several methods have been described to evaluate the inflammatory processes of the endometrium however, their efficiency remains controversial. An alternative method to assess endometrial inflammation is the leukocyte esterase (LE) test. Leukocyte esterase is an enzyme normally released by neutrophils. The hypothesis is that esterase activity reflects uterine inflammation and is associated with fertility in the postpartum period. The objective of the present observational cohort study was to validate the semi-quantitative colorimetric LE-test as a cow-side test for postpartum endometritis in a farm setting. All procedures conformed to the national guideline for care and use of laboratory animals and were approved by the institution animal care committee of the University of Montreal. A sample of 17 different commercial dairy herds for a total of 569 Holstein cows was recruited for the study. All cows were systematically enrolled on an ovulation synchronization protocol (Presynch-Ovsynch) for the first insemination. Uterine samples were collected by cytobrush for endometrial cytology (CYT) and the LE test between 26 and 42 days in milk (DIM). After rolling the cytobrush on a clean glass microscope slide, the cytobrush was plunged into a 3ml glass tube containing a 1ml of 0.9% saline. The LE strip was inserted into the glass tube and the result was recorded 2 minutes after removal. Five categories based on the color of the reagent area were used according to the manufacturer recommendations. Herd records were compiled in a databank (Dossier de santé animale: DSAHR) and validated. Pregnancy diagnosis was done by transrectal palpation 35 days after artificial insemination (AI). Reproductive data of cows were collected until at least 300 DIM. Statistical analyses were performed using a mixed logistic regression (PROC GLIMMIX, SAS) with herd as a random effect and season and lactation as fixed effects to determine the association between LE and pregnancy to first AI. Based on the highest sum of sensitivity and specificity for the pregnancy status at 120 DIM, the optimal cutoffs were 7% neutrophils for cytological endometritis (CYT+) and 1+ for endometritis based on LE (LE+). The prevalence of CYT+ and LE+ were 30, and 31%, respectively. Endometritis based on LE was detrimental to first service conception risk (LE+:23%; No LE+: 38%; P=0.03). The OR for pregnancy was 1.56 (1.00 to 2.42; p=0.05) in No LE+ compared with LE+ cows. If endometritis based on LE was grouped into 3 categories (Negative LE, Slight LE and ≥LE+), Negative LE cows (OR 1.46 0.79 to 2.73; p=0.59) were not different from the ≥LE+ cows; but cows with slight LE response (OR 3.01 1.01 to 4.76; p<0.01) had higher odds of pregnancy compared with ≥LE+ cows. Similar to LE, when cows were grouped in 3 CYT categories (Negative CYT = 0%, Slight CYT = 1 to 6% and CYT+ ≥ 7% neutrophils), the Slight CYT group (OR 3.10 1.71 to 5.60; p<0.01), but not Negative CYT (OR 1.42 0.76 to 2.66; p=0.38), had higher odds of pregnancy compared with CYT+ cows. The present study shows that the LE test is associated with uterine inflammation and may be a promising tool to predict poor reproductive performance in postpartum cows.

Keywords: Dairy cows, endometritis, leukocyte esterase