Presence and localization of bacteria in the bovine endometrium postpartum using fluorescence in situ hybridization

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The aim of this study was to investigate bacterial invasiveness of the bovine endometrium during the postpartum period. Fluorescence in situ hybridization was applied to endometrial biopsies using probes for Fusobacterium necrophorum, Porphyromonas levi, Trueperella pyogenes, Escherichia coli and a probe for bacteria in general (the overall domain Bacteria) to determine their tissue localization. Holstein cows were sampled at three time points postpartum (T1: 48±12 days postpartum, T2: 246±32 days postpartum and T3: 468±54 days postpartum). At T1, cows were clinically scored as having a uterine infection based on presence of a brownish, fetid vaginal discharge or as normal if having normal lochia. An endometrial biopsy was taken from all cows at T1 (n = 57). Endometrial biopsies were taken from the same cows at T2 and T3 if allowed by the size of the cervical canal and if the cow had not been inseminated. Fifty and 39 biopsies were obtained at T2 and T3, respectively. The biopsies were evaluated for inflammation and for presence and localization of bacteria. When analyzed by the probe for the entire domain Bacteria, bacteria were found in most biopsies irrespectively of time (T1: 79.0%, T2: 82.0%, T3: 89.7%). Fusobacterium necrophorum and Porphyromonas levi were often present in the endometrium at T1 (61.1% and 47.8%, respectively), but the prevalence decreased significantly over time. Trueperella pyogenes and Escherichia coli were less prevalent at T1 (8.8% and 10.5%, respectively) and their prevalence also decreased significantly over time. Fusobacterium necrophorum and Porphyromonas levi were often co-localized intraepithelially or in the lamina propria. Trueperella pyogenes and Escherichia coli were located only on the endometrial surface. Due to the high prevalence of tissue invasiveness, these findings emphasize the importance of Fusobacterium necrophorum and Porphyromonas levi in postpartum uterine disease of cattle and indicate that tissue invasiveness is an important aspect of the pathogenesis.

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