Canine vaginal lactic acid producing bacteria exhibit characteristics which may antagonize common urogenital pathogens
C. Scott Bailey, Megan Jacob, Theresa Beachler, Candyce Thompson, Mike Wood, Tonya Harris, Robert Loose, Jessica Heinz, Shelly Vaden
College of Veterinary Medicine, North Carolina State University, Raleigh NC

Lactic acid-producing bacteria (LAB) positively affect vaginal health of women and other species. Relevant mechanisms include superior cellular adhesion to competitively displace other organisms and antimicrobial activity. In our laboratory, we aimed to characterize the ability of LAB obtained from vaginal swabs of healthy estrus bitches to exhibit those same characteristics. We hypothesized that LAB from canine vaginal samples would bind to vaginal epithelial cells and that they would inhibit growth of common uropathogens.

Washed vaginal epithelial cells (CVEC) obtained from estrus or anestrus bitches were incubated for eight hours with either a saline control or one of twelve LAB obtained from canine vaginal swabs. Cells were then collected by filtration (10 μm filter) and bacteria adhered to 26 cells were counted by a blinded operator. Isolates demonstrating superior adhesive characteristics were tested using an agar spot assay to quantify their antimicrobial activity against five common urogenital pathogens. Selected isolates were plated onto MRS agar and incubated anaerobically. After 24 h, an agar overlay inoculated with a standard concentration of challenge organism (Enterococcus faecalis/faecium; Klebsiella pneumoniae, Proteus vulgaris, Escherichia coli) was performed in triplicate. After overnight incubation, the zone of inhibition was measured. Those isolates were further subjected to lyophilization and samples were plated weekly for eight weeks to test their stability at room temperature.

Bacterial adhesion to anestrual and estrual CVEC was significantly higher for two LAB (Weisella sp. and Enterococcus caninistini, strain 1) than control cells (p=0.01 and p=0.00001 respectively). Of these, Weisella demonstrated the highest degree of inhibition against E. coli and P. vulgaris, while the E. caninistini demonstrated the highest degree of inhibition against E. faecalis, E. faecium and Klebsiella. Lyophilized organisms exhibited minimal declines in colony forming units over eight weeks.

These studies demonstrate potential protective characteristics of two LAB obtained from canine vaginal samples and demonstrate stability of organisms after lyophilization. However, additional work is needed to demonstrate the safety of these organisms to the canine urogenital tract, including the absence of a proinflammatory action and the absence of genes encoding antibiotic resistance.

Keywords: Canine, lactic acid producing bacteria, vaginal microbiome, urogenital disease.