The in vitro Inhibitory Effect of Coagulase-negative staphylococci on Major Mastitis Pathogens

Domonique Carson, Larissa Condas, Diego Nobrega, Jeroen De Buck, Herman W. Barkema

Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary. 3330 Hospital Dr NW Calgary AB T2N 4N1.
Email: domonique.carson@ucalgary.ca

The most commonly isolated bacteria from the udder are coagulase-negative staphylococci (CNS), a group of approx. 50 species. Several studies have found that CNS have a protective effect against infection of the udder by major mastitis pathogens, while other studies have reported no protection. This inconsistency is likely due to conflicting effects by different CNS species that were earlier undifferentiated. The first aim of this study was to characterize CNS species-specific inhibitory effects against major-mastitis causing pathogens. The second aim was to characterize the inhibitory compound being produced by the CNS, and then to identify candidate genes with known bacteriocin or immunity function in whole genome sequences obtained from isolates. We hypothesize that some species will display inhibitory capabilities against major pathogens and that the inhibitory product is a bacteriocin, with genes present in various isolates and species of CNS.

Materials and Methods: The two projects used CNS and pathogen isolates obtained from the Mastitis Pathogen Collection of the Canadian Bovine Mastitis and Milk Quality Research Network. Species-specific inhibition was tested for using a modified cross-streaking method from De Vliegher et al. (2004). Of the 39 CNS isolates tested, 9 isolates, comprised of 3 *Staphylococcus chromogenes*, one *S. simulans*, one *S. epidermidis*, one *S. sciuri*, and 3, inhibited growth of Gram-positive bacteria, such as *Staphylococcus aureus*. Characterizing and identifying the compound is currently underway and will be done using a well-diffusion assay, liquid chromatography, mass spectrometry, and whole genome sequencing. We will identify which isolates possess bacteriocin-related genes and examine how common they are in an addition 500 CNS isolates of which we have a whole genome sequence.

Implications: Determining species-specific effects will allow better understanding of how CNS infections affect udder health. Identifying bacteriocins may lead to novel antimicrobials to be used for the prevention and treatment of Gram-positive pathogens, which will improve udder health and decrease the economic impact of mastitis.