

Detection of bovine mastitis bacteria in bulk tank milk samples using polymerase chain reaction

J. B. Soltau^{1*}, E. Einax¹, K. Klengel¹, J. Katholm², K. Failing³, A. Wehrend⁴, K. Donat¹

¹ Animal Health Service, Thuringian Animal Diseases Fund, Jena, Thuringia, Germany (*Corresponding author: Jennifer.Soltau@gmx.de)

² DNA-Diagnostic, Risskov, Denmark

³ Unit for Biomathematics and Data Processing, Justus-Liebig-University, Giessen, Germany

⁴ Clinic of Obstetrics, Gynaecology and Andrology for Small and Large Animals, Justus-Liebig-University, Giessen, Hesse, Germany

The aim of the study was to analyse the value of a polymerase chain reaction (PCR) examination of bulk tank milk samples for bovine mastitis pathogens as a tool to estimate the within herd prevalence of these pathogens.

A total of 6,335 quarter milk samples were collected from 1,615 cows on 51 farms in Germany. Additionally, two bulk tank milk samples were collected from each farm. The quarter milk samples were cultivated in the laboratory of the Animal Disease Found (Jena, Thuringia, Germany). The bulk tank milk samples were tested by the commercial PCR assay Mastit 4A (DNA Diagnostic, Denmark) that identified *Staphylococcus aureus*, *Streptococcus dysgalactiae*, *Streptococcus agalactiae* and *Streptococcus uberis*. The apparent within-herd prevalence (WHP_{app}) was determined by quarter milk samples of all lactating cows without clinical mastitis. First the relationship between the WHP_{app} and the cycle threshold value of bulk tank milk was analysed by calculating Spearman's rank correlation coefficients. Using a logistic regression model this study aimed at calculating the threshold level of the WHP_{app} thus allowing the detection of a herd as positive regarding the pathogen at certain probability levels (Pd).

Moderate to high correlations could be found between the WHP_{app} and the cycle threshold value of bulk tank milk using Spearman's rank correlation coefficients. The results of the logistic regression model varied depending on the number of examined bulk tank samples, the Pd and the pathogen. If one bulk tank sample was examined, the WHP_{app} thresholds for 90% probability of detection were 27.6% for *Staphylococcus aureus*, 9.2% for *Streptococcus dysgalactiae*, and 13.8% for *Streptococcus uberis*. Relaxing Pd to 50% and double sampling reduced the WHP_{app} threshold to 2.2%, 3.5% and 1.7%, respectively. *Streptococcus agalactiae* was discovered in one herd only and was therefore excluded from the calculations.

The results indicate that mastitis pathogens in bulk tank milk can be identified by the applied PCR assay. This study reveals that bulk tank milk examination is not a reliable tool for the identification of the named pathogens in single testing, but can be a valuable monitoring tool when used frequently with repeat determination.