

Cell differentiation assisting in evaluating mastitis treatment prognosis

S. Degen^{1,2}, N. Knorr¹, J.-H. Paduch¹, D. Klocke¹, V. Zoche-Golob¹, M. Hoedemaker², V. Krömker¹

¹University of Applied Sciences and Arts, Faculty 2, Department of Bioprocess Engineering – Microbiology, Heisterbergallee 12, 30453 Hannover, Germany

²Clinic for Cattle, University of Veterinary Medicine, Foundation, Hannover, Germany

Date submitted: 24/06/2015 Date accepted: 02/11/2015

Abstract

Bovine mastitis is commonly treated with antibiotics, which does not always succeed and therefore, sometimes is unnecessary. Bacteriological cure is the goal of antibiotic therapy and depends on the causing microorganism, the applied therapy, and on animal-related factors. Determining the animal-related part of the probability of bacteriological cure before applying antibiotics might help to reduce unnecessary usage. By now, this is only possible by considering individual cow data including animal-related factors such as age, mastitis history and somatic cell count. Former studies revealed that chronic mastitis lowers the probability of cure and leads to specific characteristics found in the differential cell count. The aim of this study was to develop a flow cytometric cell differentiation tool to determine animal-related factors correlating with a score-based probability of bacteriological cure. Therefore, the proportions of different cell types and their vitality in 874 Dairy Herd Improvement milk samples of 239 cows were determined by flow cytometry. The results were tested for a correlation between data of flow cytometry and the calculated animal-related probability of bacteriological cure of each individual cow by binomial logistic regression analysis. A statistically significant association to the calculated and animal-related probability of bacteriological cure could be shown for highly granulated cells, non-vital cells and macrophages. With this model, 84.4 % of all animals could be allocated to their estimated animal-related probability of bacteriological cure correctly. These findings suggest that flow cytometric cell differentiation might become an innovative tool to estimate animal-related prognosis for bacteriological cure.

Key words: Antibiotics, bacteriological cure, differential cell count, flow cytometry