Relationships of novel Somatic Cell Count traits with Clinical Mastitis using weekly observations

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ABSTRACT

Mastitis and somatic cell counts (SCC) are traits with complex biological backgrounds and associated with adverse economic effects in dairy cattle. The log of lactation average SCC (AVESCC) has often been used as an indicator of clinical mastitis (CM). A shortcoming of this SCC-measure is that the dynamic nature of CM is ignored. The aims of this study were to identify traits that better capture changes in SCC than AVESCC does, and to estimate their relationships to CM.

Clinical Mastitis and weekly test-day (TD) records of SCC, milk, fat and protein from 1006 lactations of Swedish Red and Swedish Holstein (SH) cows collected from 1989 to 2004 were used. Twenty alternative SCC traits were defined, taking into account aspects such as SCC general levels and variation along the lactation, time and level of infection, and time of recovery. Milk and fat to protein ratio were included as reference traits. Using procedures of SAS (Fastclus, Candisc and Stepdisc), SCC variables were grouped in three clusters and canonical discriminant analysis applied. A stepwise logistic linear regression model was also implemented (Proc Logistic of SAS), with the logit of CM as the response variable and the candidate SCC traits as explanatory variables.

Overall CM rate was 23%; 49.9% of lactations had at least one TD with SCC>500 000 cell/mL. Infection peaks were detected in 849 lactations (84.4% of total). The variables kept both with discriminant and stepwise regression procedures were "Standard

deviation of SCC over lactation", "At least one TD with SCC > 500 000 cells/mL" (a binary indicator), and "Number of days sick in the widest SCC peak". Cluster 1 was associated with lower standard deviation of SCC observations, absence of severe infection peaks, short periods of sickness and moderate fat/protein ratio. Cluster 3 had opposite features: high variation, presence of severe peaks, wide infection peaks and lower fat/protein ratio. Cluster 2 was in-between. A majority of healthy, non-mastitic cows (470 in 775) were associated with Cluster 1. Within Cluster 1, 93% of the cows (470 in 503) were non-mastitic. Most mastitic cows were present in clusters 2 and 3. In the regression analysis, the effects of lactation and breed were also significant: incidence of CM was lower in primiparous than in multiparous cows, and higher for the SH breed. The identified SCC traits look promising for use in breeding and management programs aimed to improve udder health in dairy cows.