Somatic cell counts determination in cow milk by near infrared spectroscopy: A new diagnostic tool

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Milk somatic cell count (SCC) is a recognized indicator of cow health and milk quality. The potential of near infrared (NIR) spectroscopy in the region from 1100 to 2500nm to measure SCC content of cow milk was investigated.

A total of 196 milk samples from 7 Holstein cows were collected for 28 days, consecutively, and analyzed for fat, protein, lactose and SCC. Three of the cows were healthy, and the rest had mastitis periods during the experiment. NIR transflectance milk spectra were obtained by the InfraAlyzer 500 spectrophotometer in a wavelength range from 1100 to 2500 nm. The calibration for logSCC was performed using partial least square (PLS) regression and different spectral data pretreatment.

The best accuracy of determination was found for equation, obtained using smoothed absorbance data and 10 PLS factors. The standard error of calibration was 0.361, calibration coefficient of multiple correlation 0.868, standard error of prediction for independent validation set of samples 0.382, correlation coefficient 0.854 and the variation coefficient 7.63%. The accuracy of logSCC determination by NIR spectroscopy would allow health screening of cows, and differentiation between healthy and mastitic milk samples.

When the spectral information was studied it has been found that SCC determination by NIR milk spectra was indirect and based on the related changes in milk composition. In the case of mastitis, when the disease occurred, the most significant factors that simultaneously influenced milk spectra were alteration of milk proteins and changes in ionic concentration of milk.