

Near infrared spectroscopy for cow identification and *in-vivo* mastitis diagnosis

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With the new trend of robotic milking, quality control of milk and cow's health has become very important issue in the dairy industry. In the near future, a multipurpose technology will be required for feed back control in the fully automated milking units.

In this paper, Near Infrared Spectroscopy (NIRS) and new classification method for spectral data analysis have been presented for cow identification and *in-vivo* mastitis diagnosis. NIR spectra of Holstein cow's udders were collected in interreflectance (reflection and diffusion) mode with portable spectrophotometer, Fruit Tester 20 (Fantec Co., Ltd.). Three spectra were acquired on each udder quarter, before milking, in the barn, by directly fitting the fiber probe at the cow's body. After NIR spectral analysis, quarter foremilk samples were collected from the scanned cows and submitted for bacterial analysis to obtain reference data. Experiments were held for 8 consecutive months where data was collected once a month. Spectra from healthy cows and cows with CNS mastitis were analysed in a data set of 258 udder tissue spectra from a total of 23 cows, acquired at different lactation stages and seasons. Modified SIMCA classification method was applied for spectral data analysis. As a result, sensitivity of 70.4 % and specificity of 67.9 % were achieved. In another experiment, udder screening was successfully performed with NIR hand held instrument at dairy farms located overseas. The results, also, showed feasibility for cow identification based on their tissue spectra.