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## Prediction of mastitis via mid infrared analysis of milk: Validation through experimental approach

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Mastitis infections in dairy cows result in significant economic losses due to costs associated with reduced milk production, milk disposal, veterinary treatments, increased labor, and premature culling animals. Furthermore, mastitis can alter milk quality by increasing the somatic cell count (SCC) and altering other milk components.

Mastitis is detected through SCC, usually analyzed by flow cytometry. But a potential alternative using mid infrared (MIR) spectroscopy have been studied through different projects as HappyMoo or MastiMir. The advantages of using MIR analysis could be cost-efficiency, faster and more versatile analysis. On the other hand, SCC alone is not always a perfect indicator of mastitis, given that there are cases where mastitis may not immediately lead to a notable increase in SCC, especially in the early stages of infection when SCC remain high over long period without infection. It is consequently interesting to investigate complementary measurement methods besides SCC counting. This alternative via spectral standardization could be used on benchtop apparatus, but potentially also on miniaturized MIR spectrometers.

The objective of this work will be to evaluate the potential of MIR to detect mastitis by inducing mastitis in an experimental context. The experiment used four different concentrations of S. aureus bacteria, each concentration across five distinct cows. Daily analyses during an eight-day period have been conducted with MIR spectroscopy and SCC analysis on each udder alongside the measurement of bacterial concentration on the infected udder. MIR analysis indicate a significant distinction between infected and non-infected udders, through the prediction of lactose, NAGase, sodium and lactate dehydrogenase.

Keywords: Mastitis, mid infrared spectrometry, precision livestock farming.