BROMEDIR - PART B : Evaluation of a miniaturized FT-MIR instrument for in-farm milk analysis

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Mid Infrared (MIR) analysis of milk is a powerful technology to predict a wide range of phenotypes related to fine milk composition, cow health, nutrition and environmental footprint. MIR analysis of individual cow milk samples is used by many milk recording organizations around the world for cow management. However, milk recording is classically organized every 4 to 6 weeks in farms, while to enhance the capacity of MIR analysis to be used for precision livestock farming (e.g. for early detection of diseases...), the frequency of analysis should be increased. A potential solution to achieve such high frequency measurements is to bring the MIR spectrometer directly to the farm to enable daily analyses. The BROMEDIR project aims to fill this gap by developing a portable miniaturized spectrometer operating in a very wide spectral range (5000-1000 cm-1), dedicated among other applications to milk analysis. Thanks to the recent technological miniaturization advances, a prototype was developed to meet dairy stakeholders' requirements and affordable cost

The objective of this work is to develop and assess the performance of the miniaturized portable MIR spectrometer in milk application. The instrument is evaluated, among other criteria, based on the general spectral pattern, the practical signal to noise ratio, the repeatability and reproducibility over time of both the spectral response and the main milk components. The accuracy of the spectrometer to predict the main milk components is evaluated against benchtop predictions after the analysis of 50 raw milk samples from individual cows. Finally, the possibility to transfer existing MIR models is assessed through PDS standardization of the BROMEDIR spectrometer against benchtop instruments.

This approach would open great potential by enabling the use of past developments within the FT-MIR milk analysis framework (e.g. fine milk quality and health of cows, among other).