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Session 56. PLF for health, behaviour and welfare, Part 1

Date: Tuesday 3 September 2024; 8:30 - 12:30
Chair: Foy / Morgan

Theatre Session 56

Poster Session 56

Constitution of an international dataset on blood biomarkers in dairy cows: a preliminary study to develop milk MIR models

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Blood composition remains the gold standard to monitor and detect various health disorders of dairy cows. Estimating blood components through non-invasive methods would enable to scale up the measures in terms of cow number and time frequency, while aligning with societal requirements. This work begins with the constitution of a large dataset from multiple organizations across 12 countries. The first objective was to conduct an explanatory study, to better understand the variability of blood biomarkers regarding animal characteristics, sampling protocols and their relationship with other phenotypes of interest. The second objective was to improve on the large variability to develop robust models based on milk MIR spectra. Data merging resulted in a dataset of approximately 10,000 individual records of blood reference values and associated milk spectra. The majority of records were associated with blood BHB and NEFA, and fewer records with glucose, IGF-I, fructosamine, cholesterol, urea, progesterone, calcium and phosphorus. This preliminary work will facilitate a better understanding of the sources of variability in biomarkers, to highlight optimal modelling methodologies among linear and non-linear algorithms, and to estimate the capacities of milk MIR spectra to provide information on those traits under routine conditions

In-line milk analysis: how accurate can we get?

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As milk contains valuable information on the cow's metabolic status, regular analysis of the produced milk is a very efficient way to monitor cow and udder health. Near infrared (NIR) spectroscopy has been shown to be valuable for rapid, non-destructive and on-line analysis of the raw milk composition. In the past 15 years, several prototypes for in-line milk analysis have been developed and validated, some of which are commercially available nowadays. Still, none of these sensors got ICAR certified so far, generally indicating that the accuracy, repeatability and reproducibility are insufficient. Based on our own 15-year experience, we will present and discuss the main challenges for in-line milk analysers by reflecting results and sensor performances reported in the past against those obtained with our own research-prototypes for in-line milk analysis. These prototypes have been extensively tested at different dairy farms and under varying conditions over the past 7 years. Although the initial (calibration) accuracy of the prediction of milk fat, protein and lactose is largely depending on the signal-to-noise ratio of the sensor itself, the predictions afterwards are subject to drift that is mainly characterized by a bias. Part of this bias drift comes from variation in milk temperature, which follows a seasonal pattern and can be accounted for by robust modelling. Additionally, unsupervised techniques and using the bulk milk analysis to correct for this bias can help and bring the performance of the sensor within the required specifications. Finally, it was found that sensor maintenance and good cleaning and milking practices are crucial for optimal sensor performance.