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Abstract Submission Form

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Preferred presentation Oral

Preferred session Session 8: Global challenges in measuring methane in ruminants

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Title of your paper Predicting methane emissions of Australian dairy cows using mid-infrared spectroscopy from milk samples

Insert ABSTRACT text

Genetic selection for reduced methane emissions from dairy cows has received increasing attention in the last decade, but this requires a large reference population. As such, a significant amount of research has been carried out to explore easy and cost-effective predictors of measure methane emissions from dairy cows that could become available on a large scale, including the performance of mid-infrared (MIR) spectra of milk. In this study, we investigated the relationship between MIR and methane emissions in Australian lactating dairy cows. Data on methane production (g/d), methane yield (g/kg of dry matter intake), methane intensity (g/kg of milk), and MIR spectra from 240 Holstein lactating cows that were part of two 32-day experiments conducted between October 2016 and December 2017 were used. Methane emissions were measured during a period of 5 consecutive days using the SF6 tracer technique, with corresponding morning milk samples were taken for milk composition analysis where MIR spectra were retained. Prediction models were developed using partial least-square regression and performance was evaluated through a leave-one (animal)-out cross-validation. The prediction accuracy was measured by the coefficient of determination. Two modelling strategies were examined, that were predictions of methane emissions using MIR spectra collected on the same day and those collected on the following day. The effect of lactation stage was also explored. In the first scenario, the prediction accuracy of methane

production, methane yield and methane intensity were 0.25, 0.20, and 0.24, respectively while these were 0.33, 0.53 and 0.38 when using MIR spectra collected a day after the methane measurements occurred. Further, incorporating the effect of lactation stage into the model greatly improved the prediction accuracy to 0.29, 0.24 and 0.33 versus 0.39, 0.55 and 0.42 when using MIR spectra collected on the same day versus the following day, respectively. In conclusion, our preliminary results indicate the potential of MIR spectra to predict methane emissions of Australian dairy cows. Additional data, especially that are measured on different feeding systems or breeds of cows, is essential to improve the prediction accuracy and the robustness of the models.

Enter keywords methane emissions, dairy cows, mid-infrared spectroscopy