

Influence of Cow Parity on the Precision of Near-infrared Spectroscopic Sensing System for Assessing Milk Quality During Milking

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INTRODUCTION & AIM

Raw milk constituents such as milk fat, lactose and somatic cell count (SCC) are great determinant factors for milk quality

An online real-time near-infrared (NIR) spectroscopic sensing system has been developed for milk quality assessment

However...

Various cow parity have probably been one of the major hindering factors to obtaining excellent calibration performances

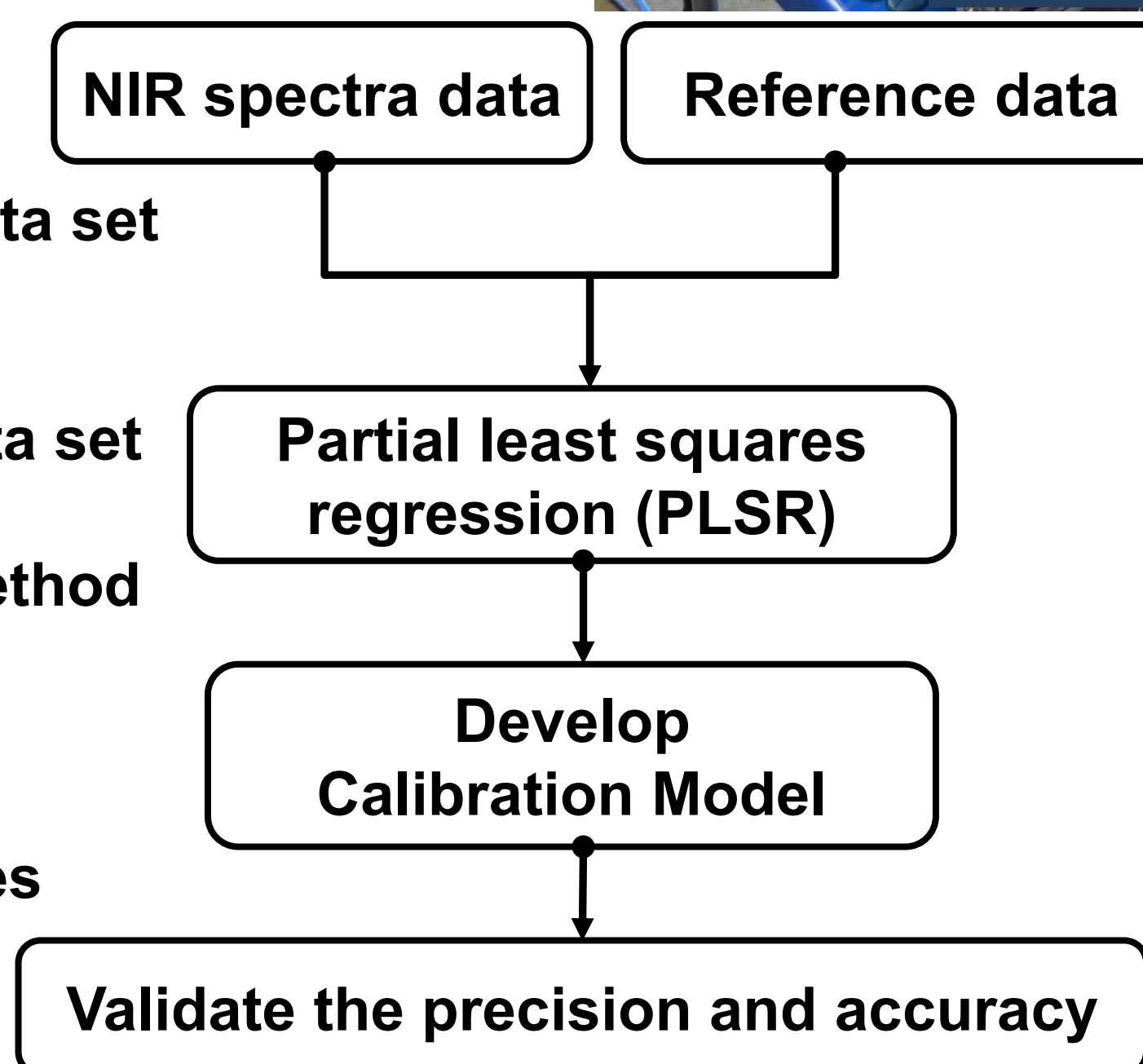
Aim... to investigate the influence of cow parity on the precision and accuracy of calibration models

MATERIALS AND METHOD

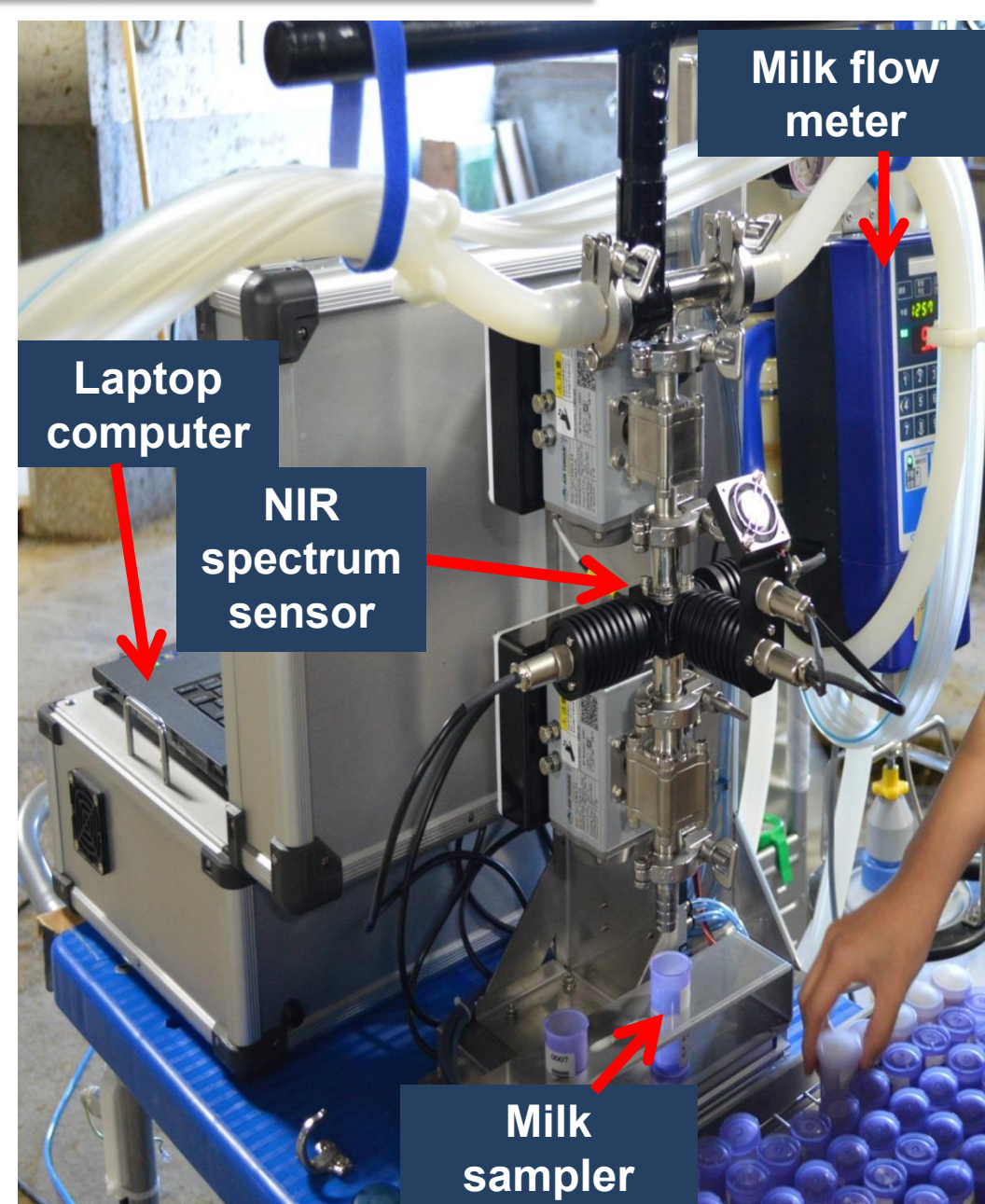
- Cow information:**
Two Holstein cows in their first and second calving phase were used
- Reference analyses:**
MikoScan and Fossomatic device
- Online NIR spectroscopic sensing system** was designed & constructed
- Wavelength range:**
700 to 1050 nm (1 nm intervals)

Chemometric Analyses

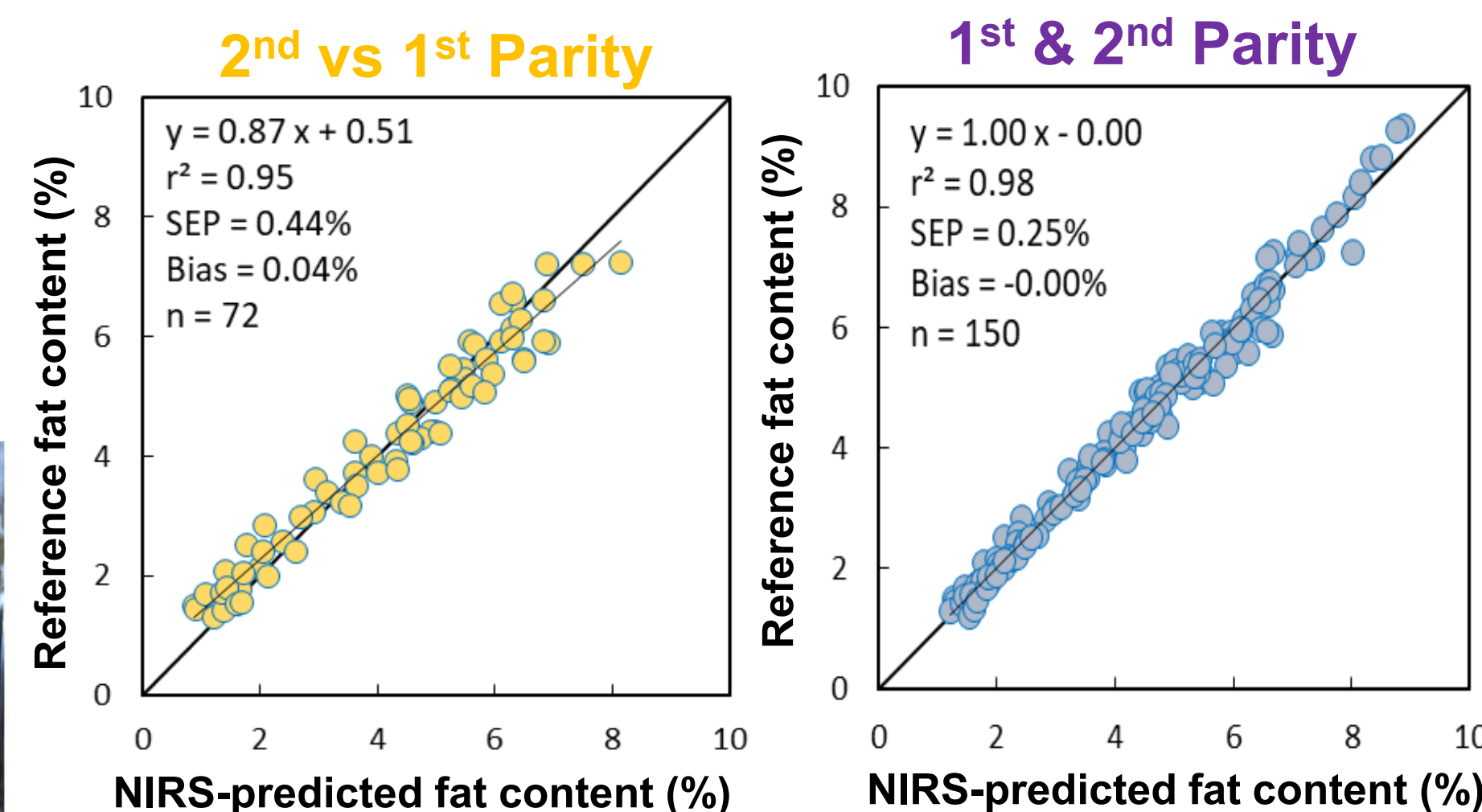
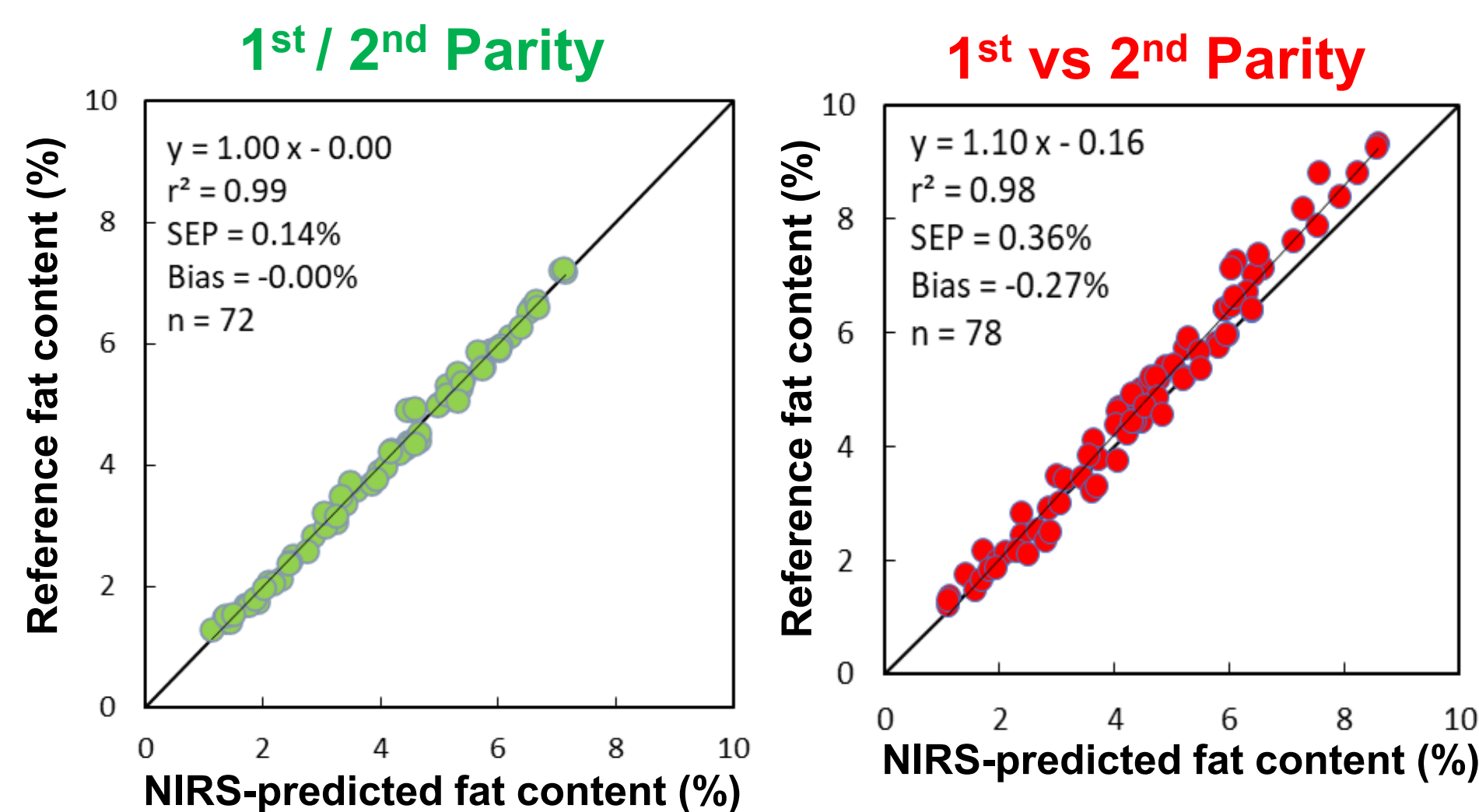
- Calibration set:**
1st & 2nd sample data set
- Validation set:**
1st & 2nd sample data set
- Cross validation method** was used
- Statistical method:**
partial least squares regression (PLSR)



Flow chart for developing calibration model



RESULTS & DISCUSSION



- The precision and accuracy of the calibration models of milk fat was **very high** and **similar** but **different** for milk lactose and **SCC** for 1st and 2nd cow parity

NIR validation statistics for milk quality determination using near-infrared spectroscopy

Milk quality indicators	1 st Parity	2 nd Parity	1 st vs 2 nd	2 nd vs 1 st	1 st & 2 nd
Fat (%)	0.99	0.99	0.98	0.95	0.98
Lactose (%)	0.87	0.78	0.43	0.41	0.59
SCC (log SCC/mL)	0.90	0.87	0.71	0.52	0.79

Coefficient of Determination (r^2) values

The NIR spectroscopic sensing system developed in this study could be used for online real-time assessment of milk constituents and SCC during milking

CONCLUSION

- The precision and accuracy of calibration model for **milk fat was excellent** and **similar** for all the five conditions
- The accuracy of calibration model for **milk lactose and SCC varied** for all the five conditions considered in this study. Thus;
- It was suggested that cow parity could affect the accuracy of calibration models**

FUTURE WORK / ACKNOWLEDGEMENT

- To explore other limiting factors (cow lactation stages and feeds)
- To develop a model that would compensate for these factors and improve the calibration models for each milk constituents and SCC

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