



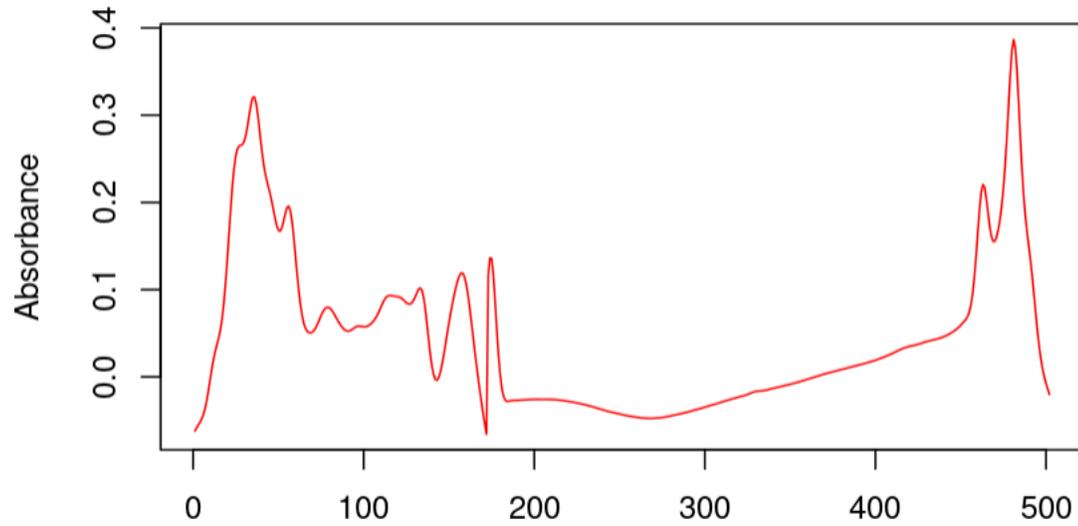
Differences in cow milk mid-infrared spectra collected during morning and evening milking and their implications

Maria Frizzarin

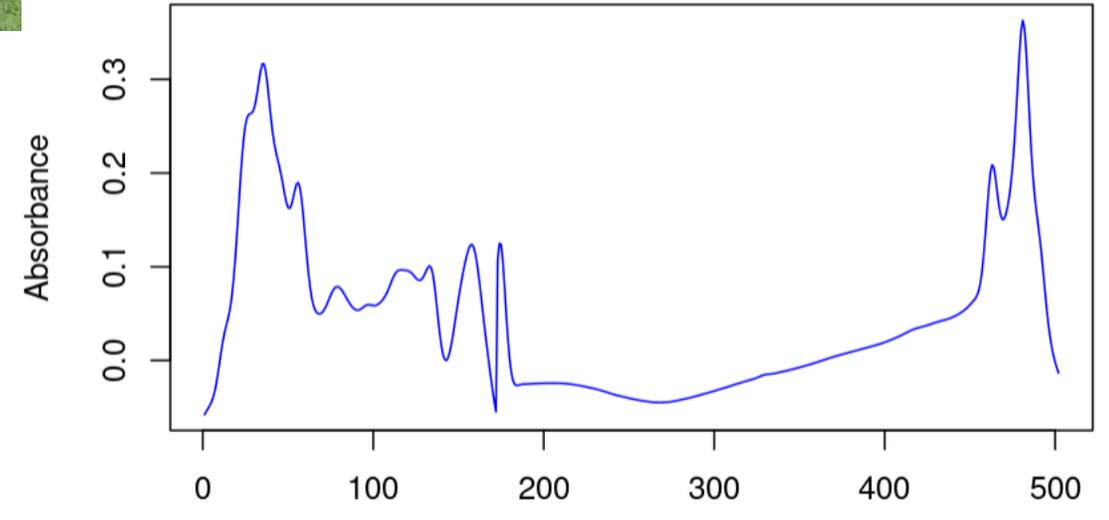
02/04/2025



Objective



Yield
Fat



Wavenumber



Protein

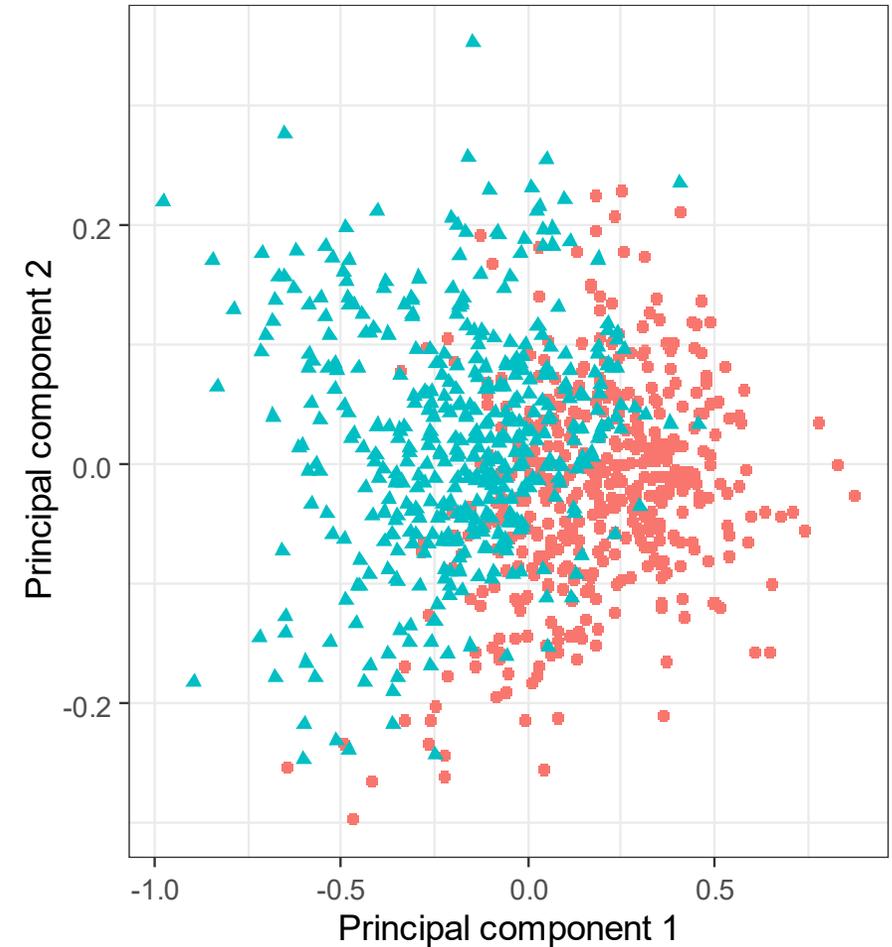


Wavenumber



Data

- 199,288 morning spectrum
- 199,288 evening spectrum
- 2,602 cows
- From 2016 to 2020
- 7 Teagasc research farms



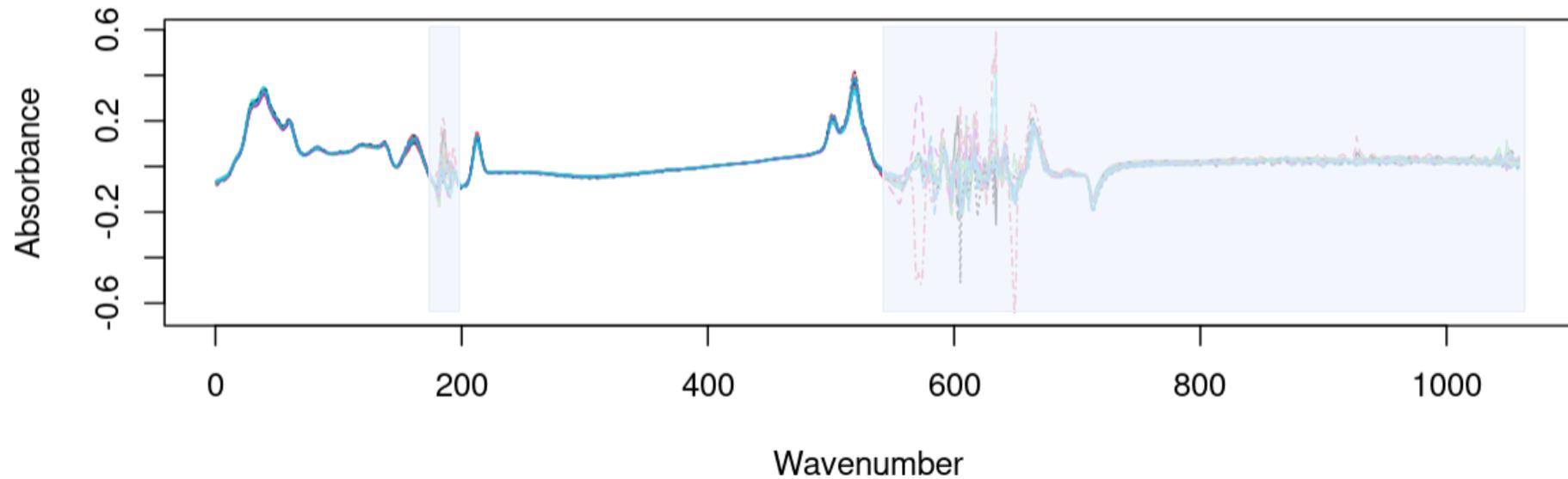
Red = Morning

Blue = Evening



Analyses

- 502 wavelengths considered





Analyses

- Internal correlation between morning wavelength values vs internal correlation between evening wavelength values
- Difference between morning and respective evening wavelength values
- Pearson correlation between morning and respective evening wavelength values
- Quantified for
 - Entire dataset
 - Within lactation stage, farm, year

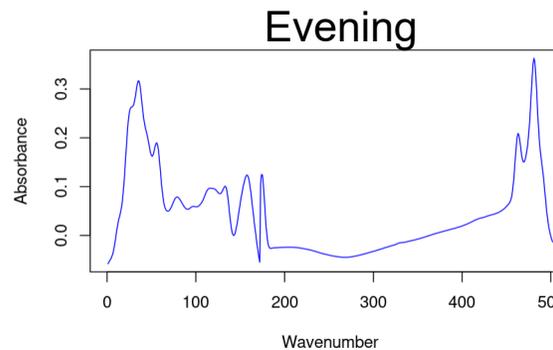
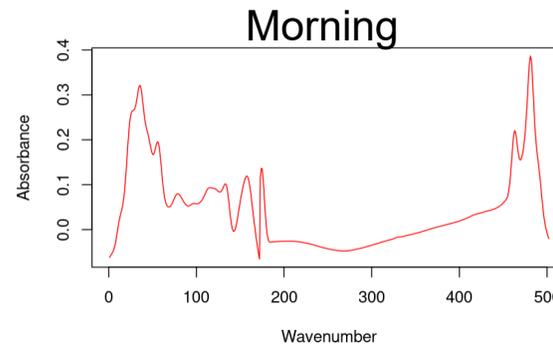


Analyses

- Prediction equations for nitrogen use efficiency (NUE)
- $$\text{NUE} = \frac{(\text{N in milk} + \text{N in the conceptus} + \text{N used for the growth} + \text{N stored in the reserves})}{(\text{N intake} + \text{N mobilized from the reserves})}$$



NUE



Predicted from equations developed on

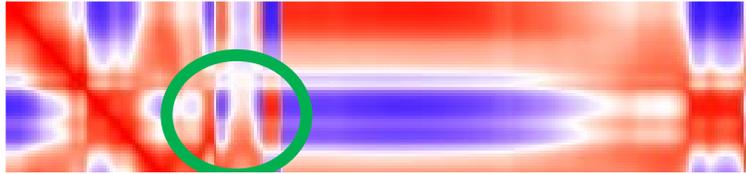
Morning spectra
Evening spectra
Weighted morning and evening

Morning spectra
Evening spectra
Weighted morning and evening

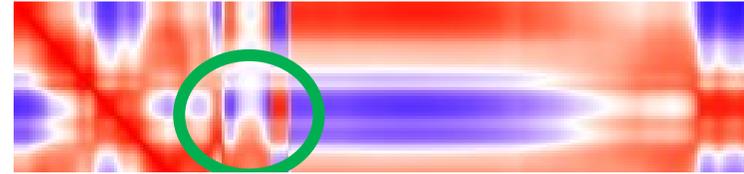


Results

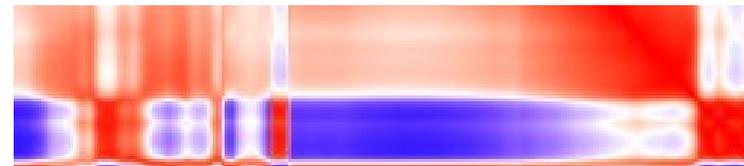
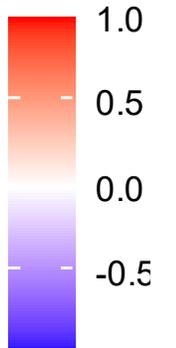
Morning



Evening



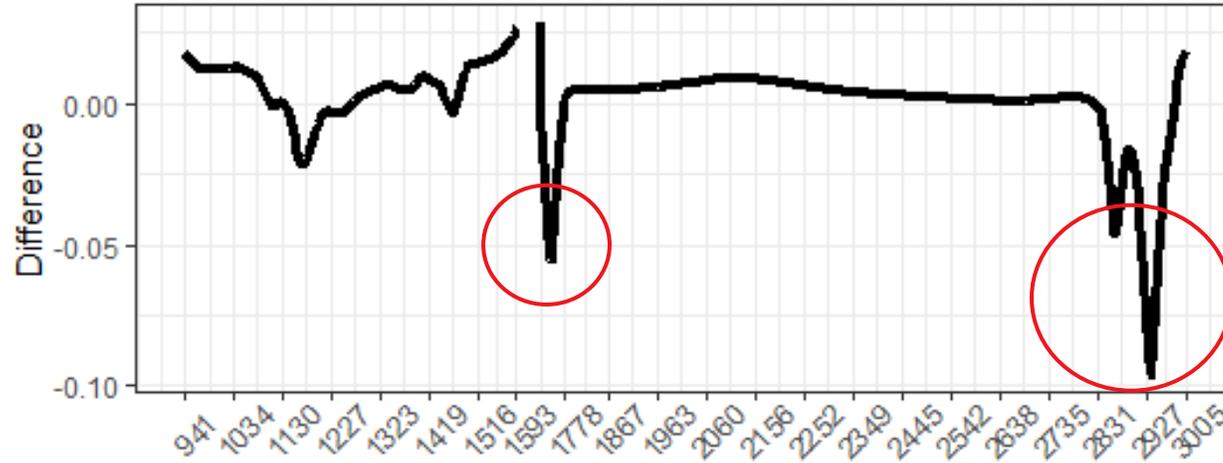
Internal relationships among the absorbance values for the morning spectra differed ($P < 0.05$) from those among the absorbance values for the evening spectra



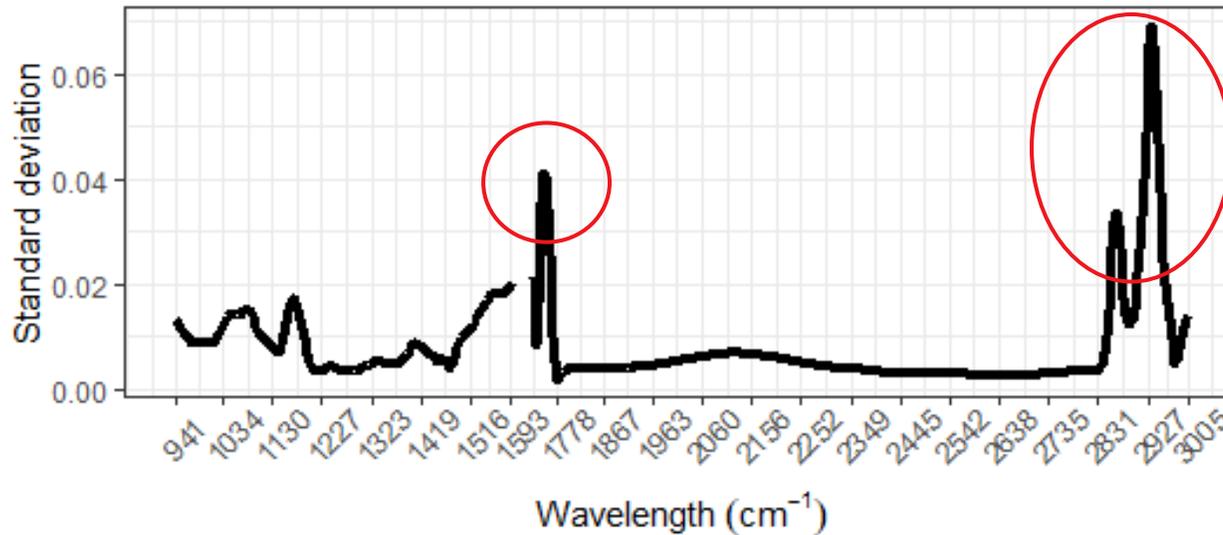


Results

Morning
minus
evening
wavelength
values



SD morning
- evening
wavelength
values



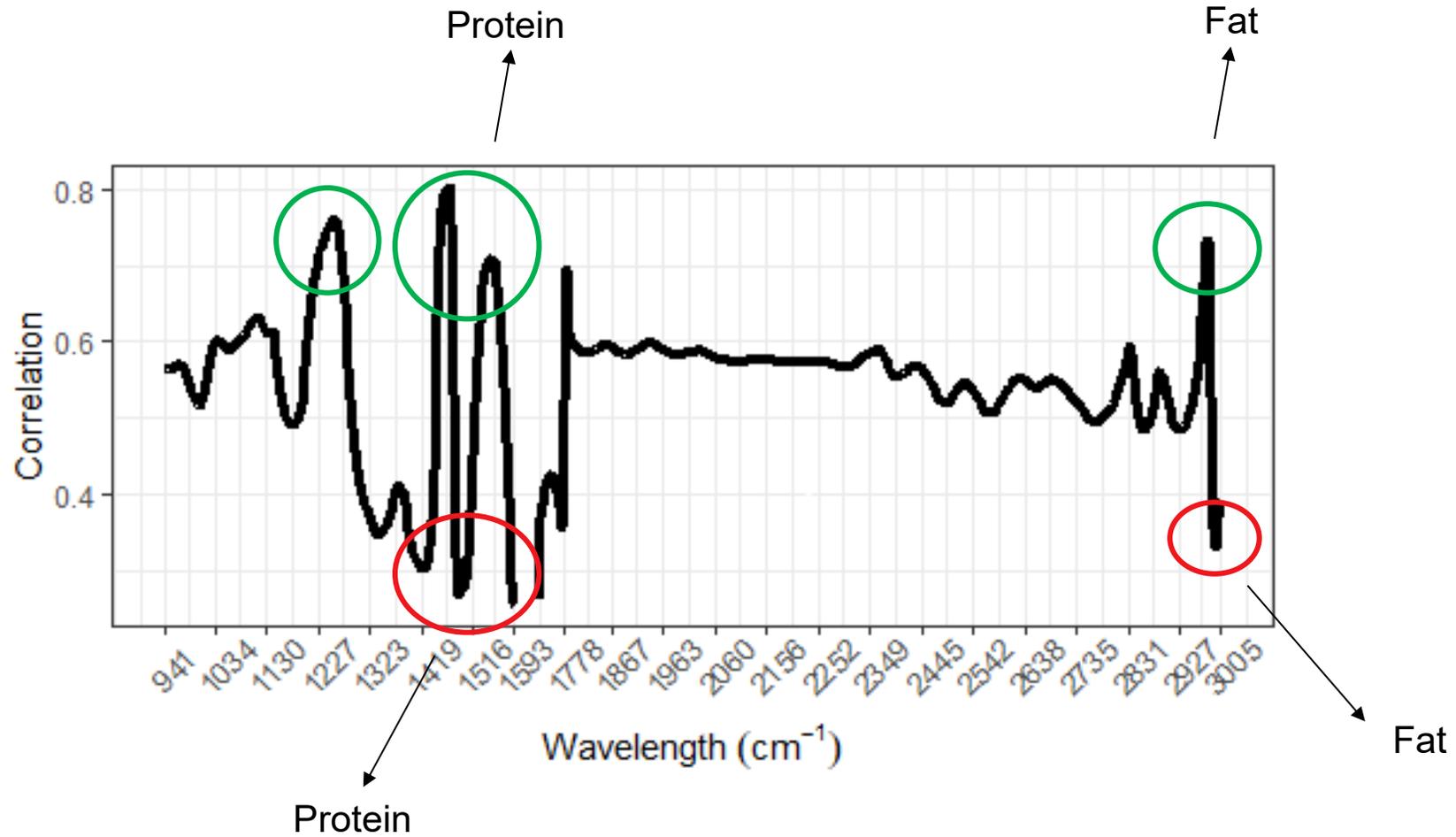
Fat

Name of the pr
Sender



Result

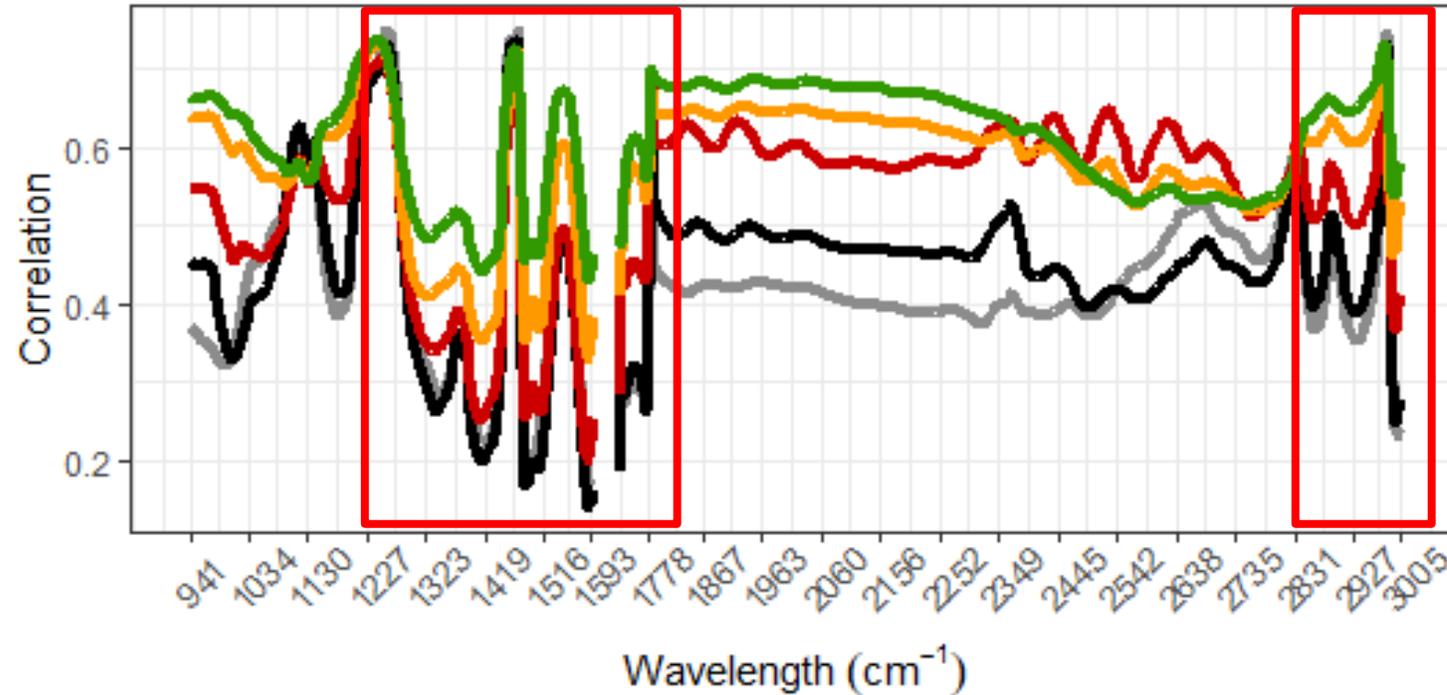
Correlation





Results

Correlation
within
lactation
stage



5 to 60 DIM (grey line)
61 to 120 DIM (black line)
121 to 180 DIM (red line)
181 to 240 IM (orange line)
240 to 305 DIM (green line)

Consistent profiles



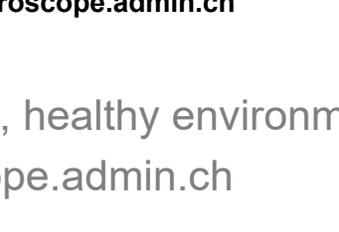
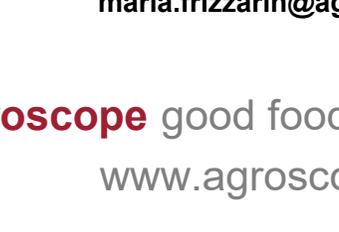
Results

Calibration	Validation		r	RMSE
Morning	Morning		0.70	3.49 ^a
Evening	Morning		0.62	3.85 ^b
Average	Morning		0.67	3.63 ^c
Evening	Evening		0.70	3.46 ^a
Morning	Evening		0.66	3.85 ^b
Average	Evening		0.67	3.79 ^b



Conclusions

- Distinct internal relationships among the absorbance values for morning and evening milk spectra
- Certain spectral regions exhibit substantial differences in absorbance values between morning and evening milk samples
- Other spectral regions had weak correlations between the absorbance values of morning and evening spectra
- More pronounced differences in early lactation
- Variability in absorbance values at different wavelengths between morning and evening samples can influence the accuracy of predicting animal-related traits from milk MIR



Thank you for your attention

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