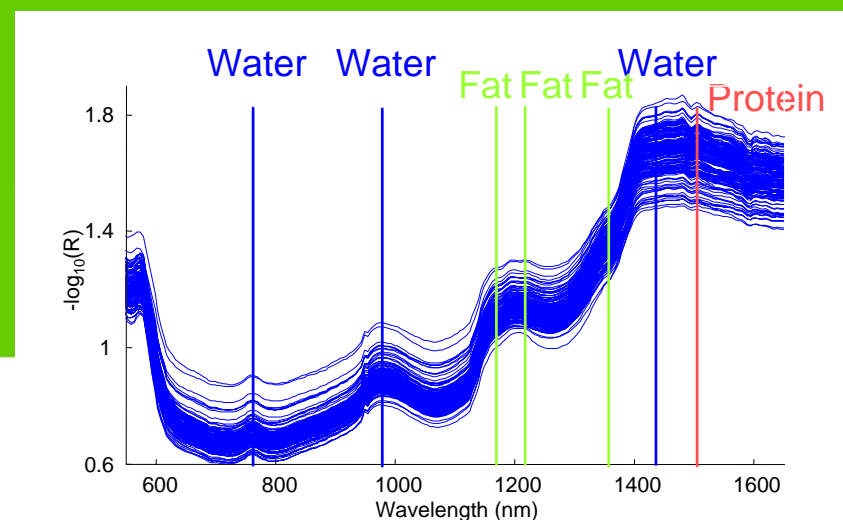


Near Infrared (NIR) measurements of meat quality – current status

Katja Rosenvold
MIRINZ Meat Science
16th October 2007

<http://www.agresearch.co.nz>

<http://www.mirinzi.co.nz>



Farming, Food and Health. **First**

Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

Contents



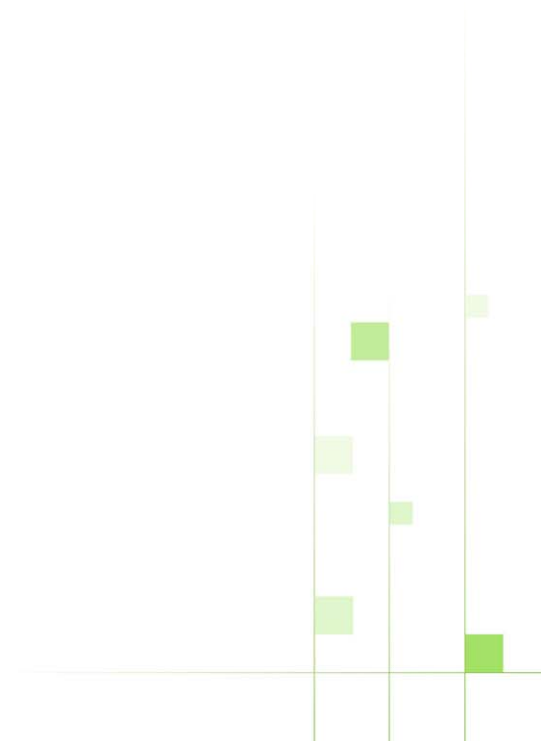
Brief introduction to near infrared (NIR) spectroscopy
Experimental design

Results:

- Combined beef and lamb calibrations
- Predictions of beef tenderness

Conclusions

Ongoing activities



NIR spectroscopy

agresearch

Near infrared
light



Reflectance

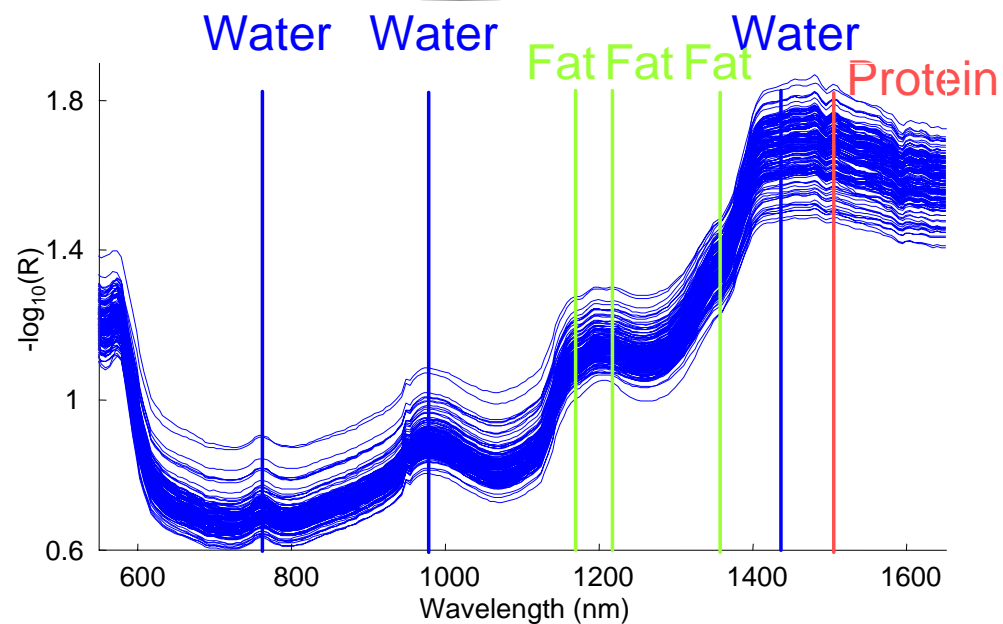


Absorbance



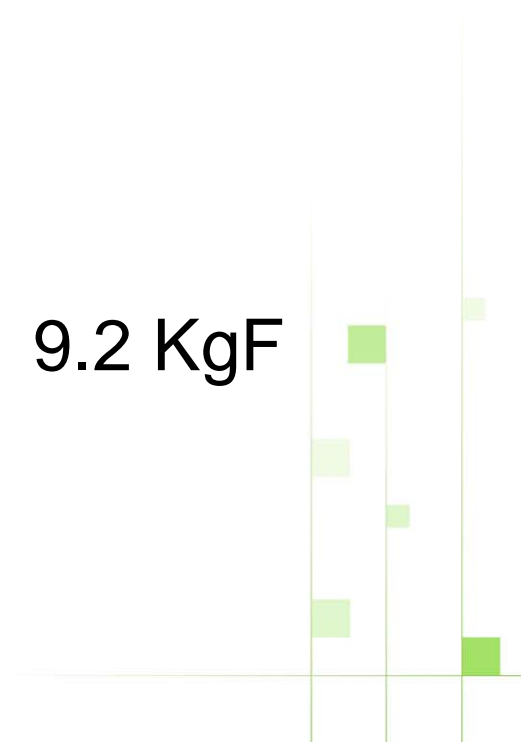
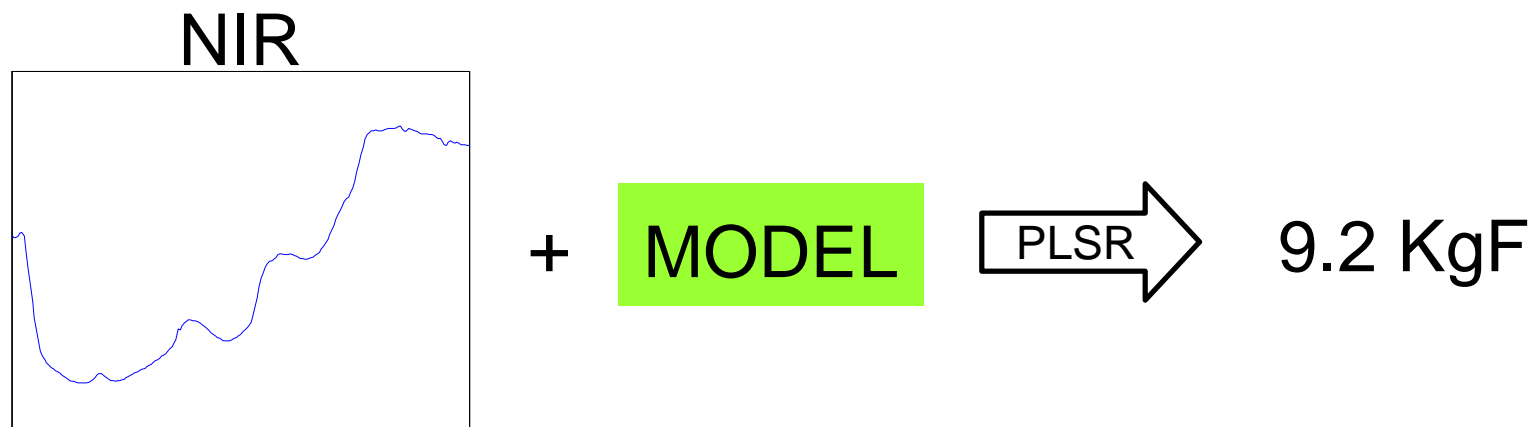
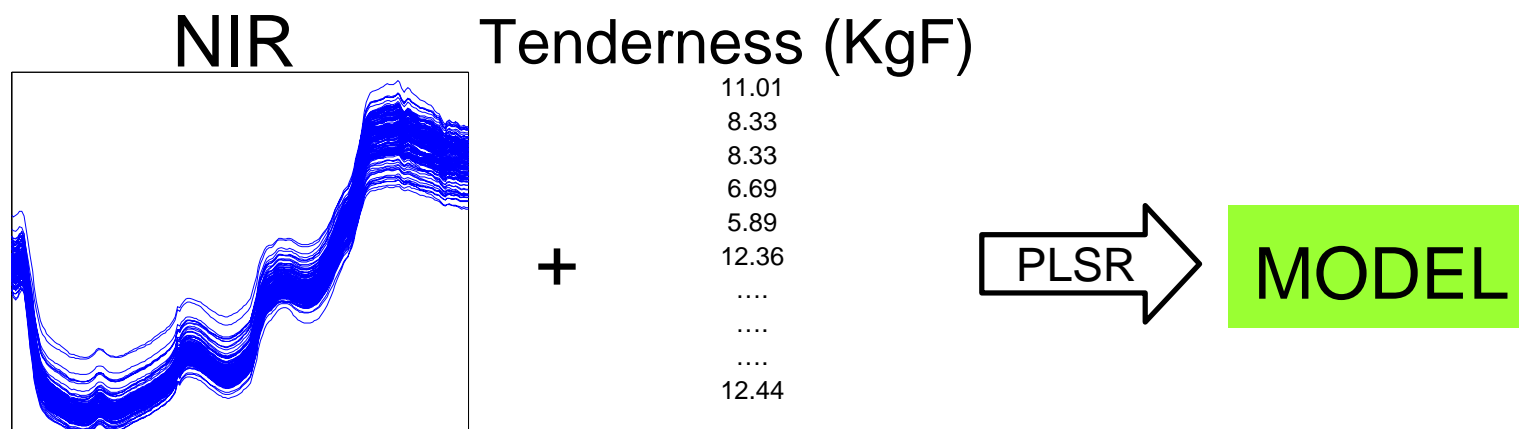
QUALITY ATTRIBUTES

NIR: Chemical and textural info



Development of NIR calibration models

agresearch



Experimental design

A wide variation in the attributes (e.g. pH and tenderness) is required for the development of robust NIR calibration models

BEEF TRIAL

70 loins from 35 steers

Treatments:

- Electrical stimulation (+/-)
- Wrapping (+/-)
- Pre rigor temperatures (15/35°C)

Post rigor ageing at 15°C

Measurements:

pH
shear force
NIR

LAMB TRIAL

80 loins from 80 lambs

Treatments:

- Electrical stimulation (+/-)

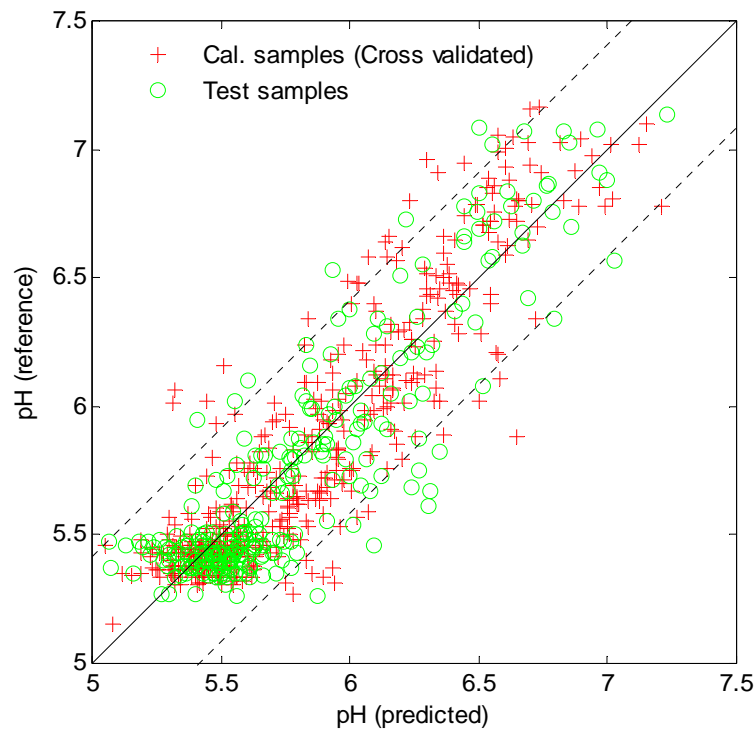
Samples were wrapped, held at 15°C pre rigor and aged at 15°C post rigor

Measurements:

pH
shear force
NIR

Beef calibration models

pH

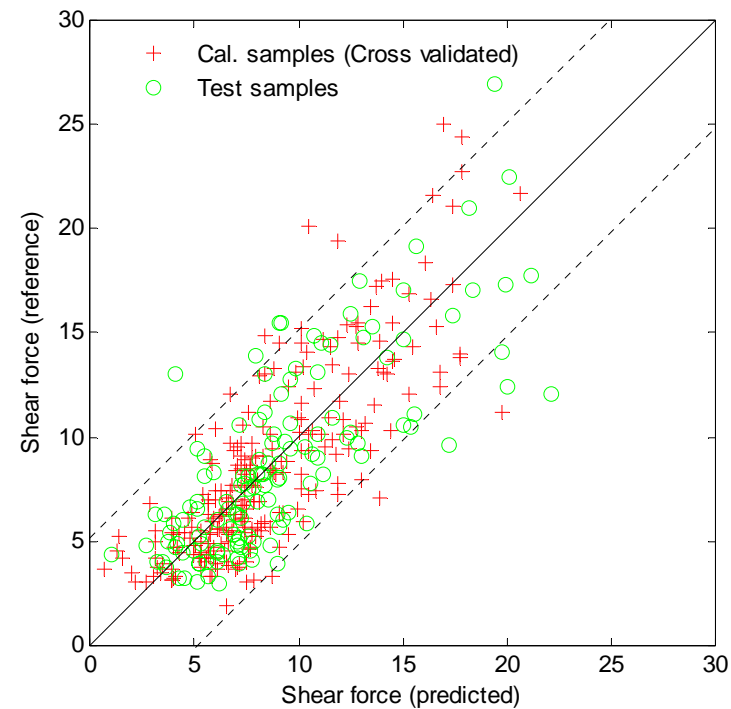


$R^2 = 0.79$

$SEP_{val} = 0.22$ units

#spectra: 520 (cal); 363 (val)

shear force

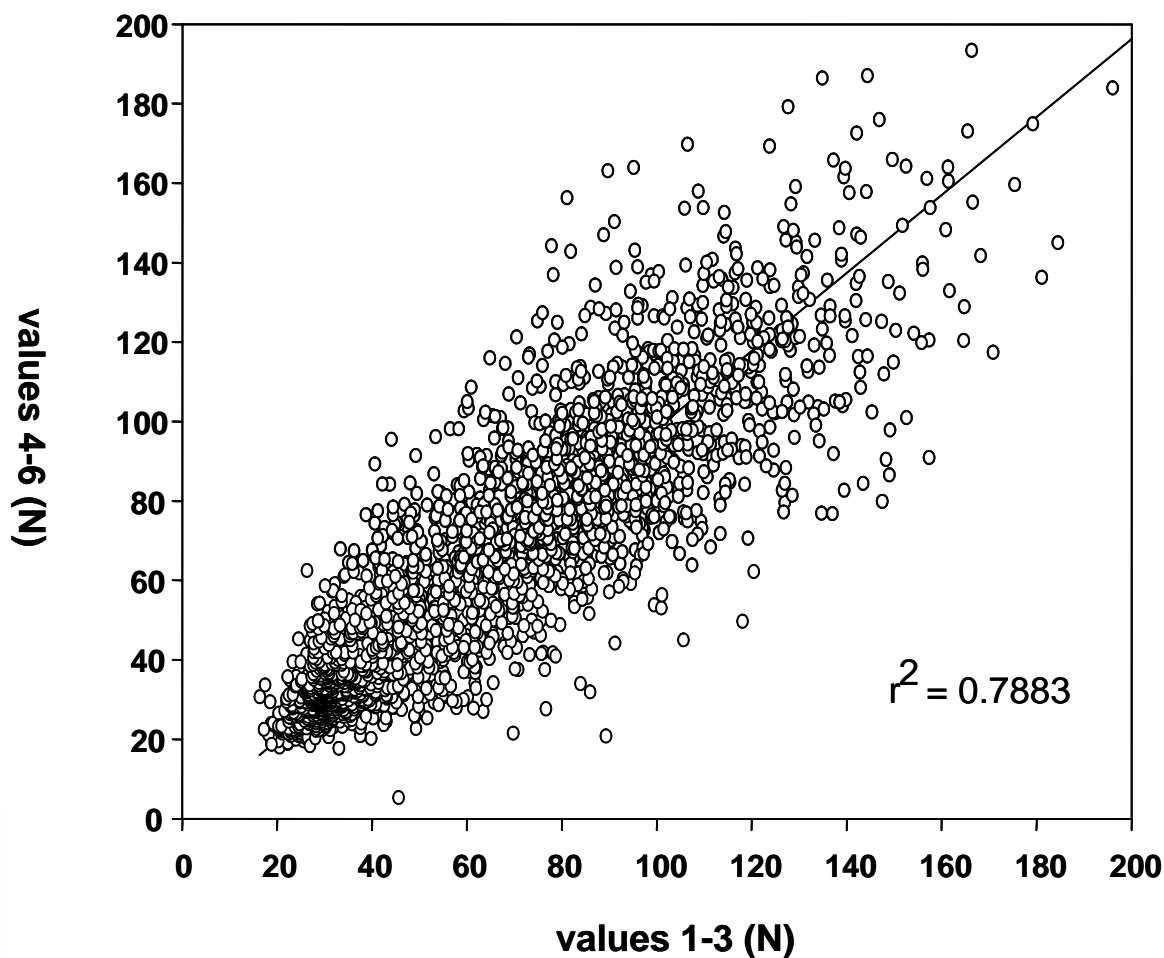


$R^2 = 0.60$

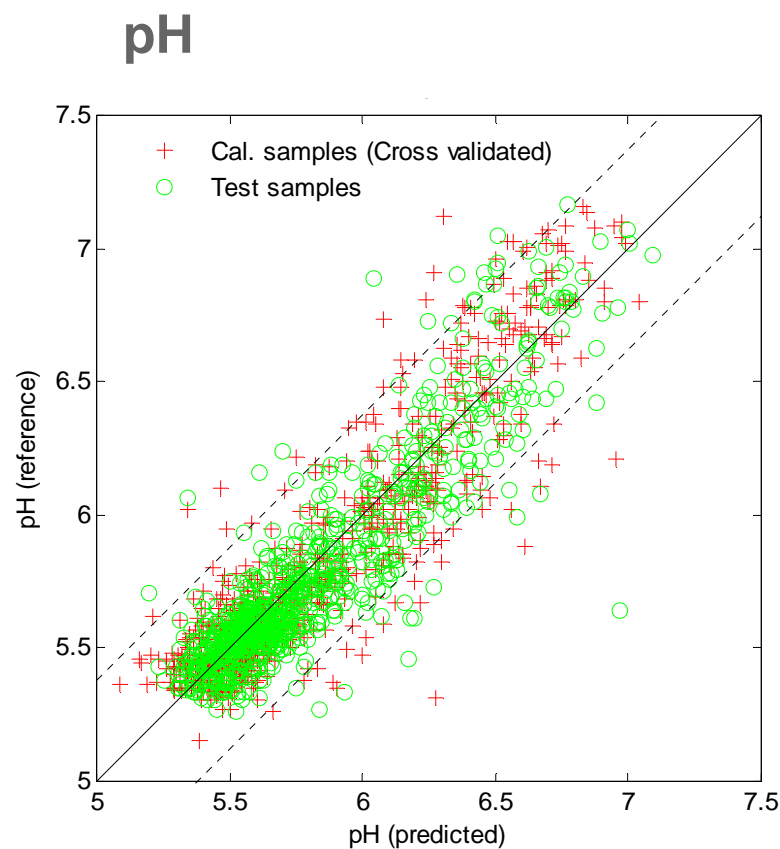
$SEP_{val} = 2.97$ kgF

#spectra: 248 (cal); 133 (val)

NIR calibration models will never be better than the reference measurements



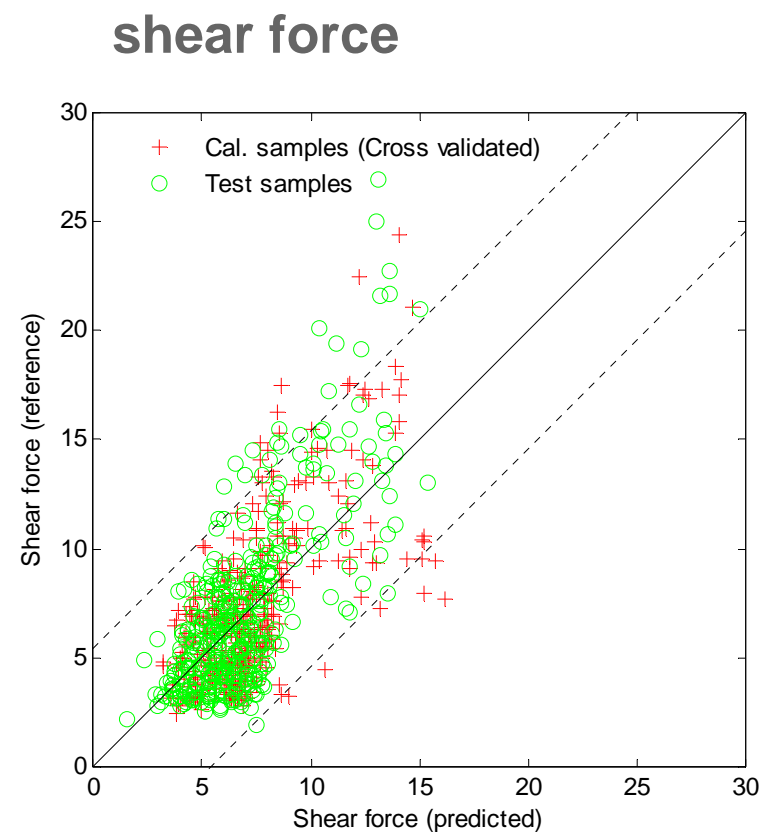
Combined beef & lamb calibration models



$R^2 = 0.81$

$SEP_{val} = 0.17$

#spectra: 756 (cal); 795 (val)



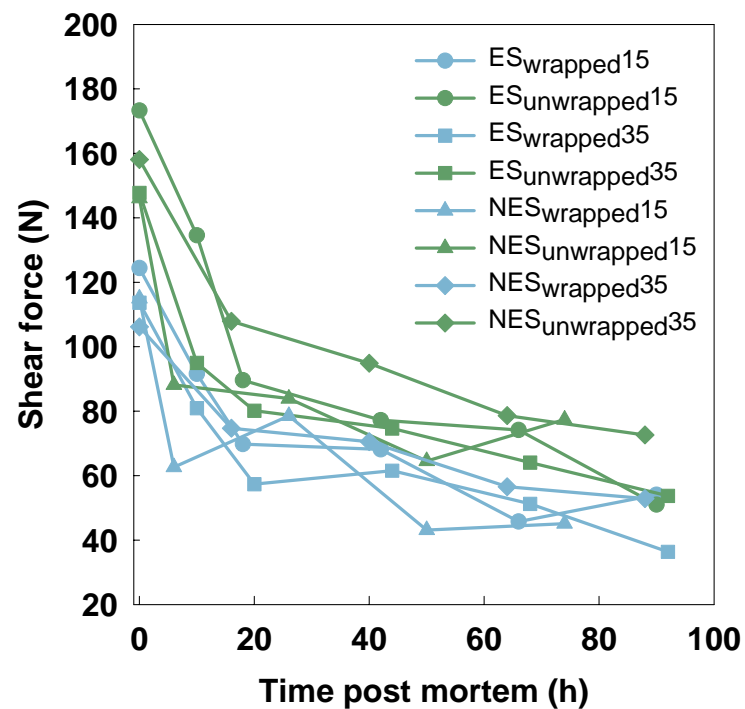
$R^2 = 0.53$

$SEP_{val} = 2.80$

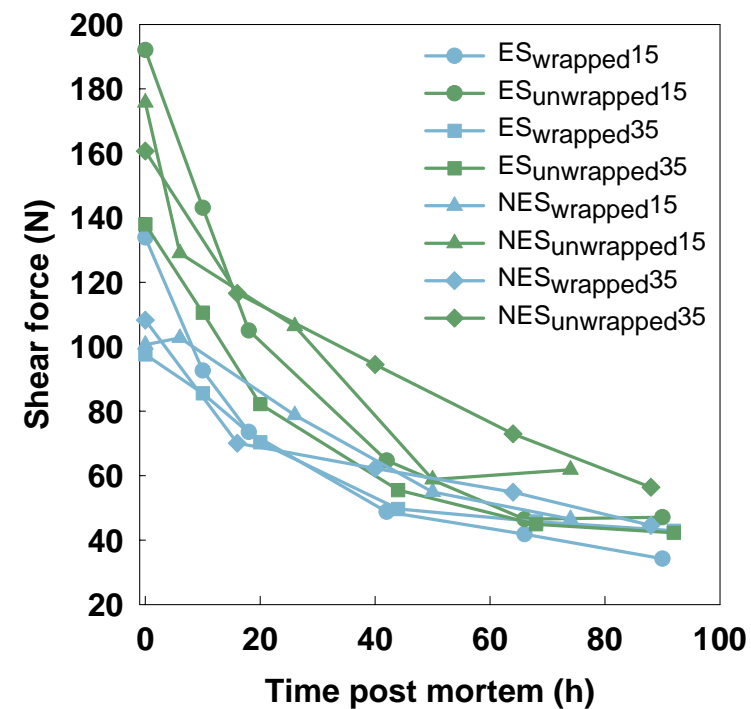
#spectra: 361 (cal); 375 (val)

Beef tenderness

NIR prediction

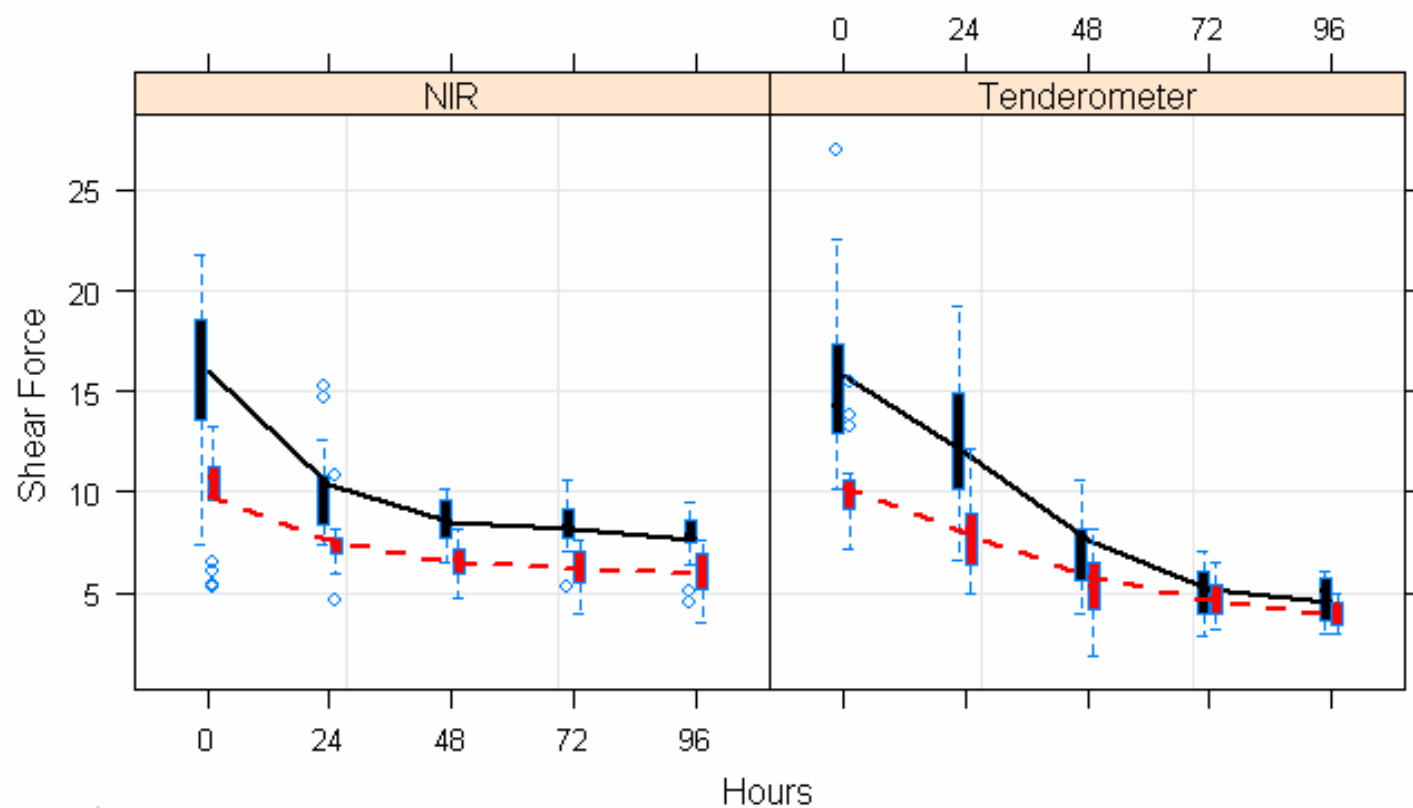


Measured

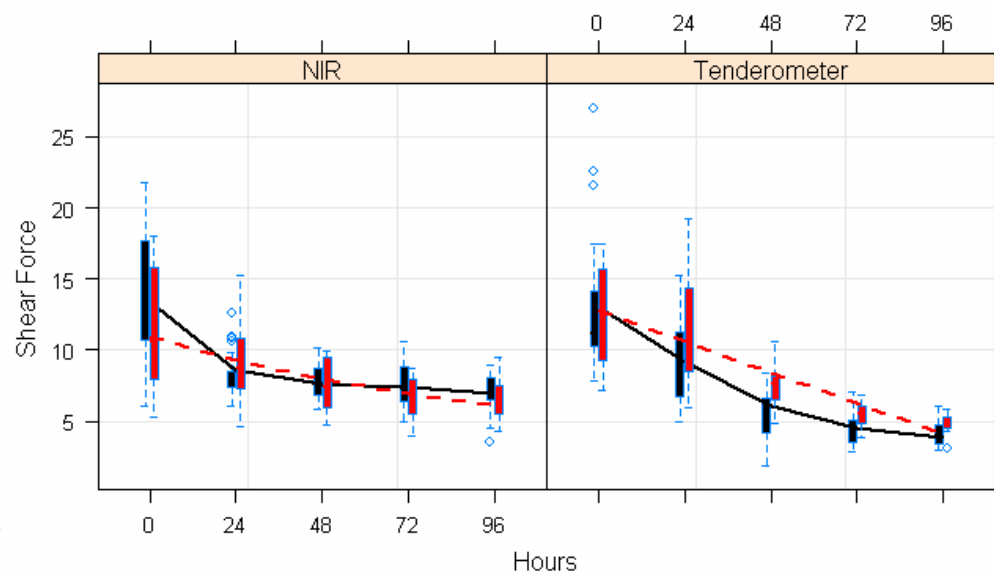
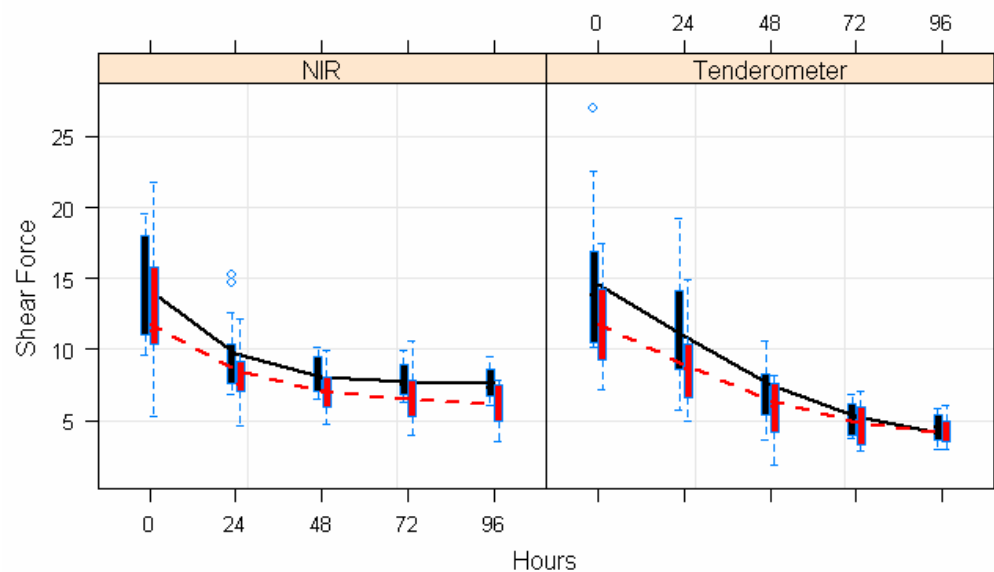


Effect of wrapping

agresearch



Effect of temperature (top) electrical stimulation (bottom)



Conclusions

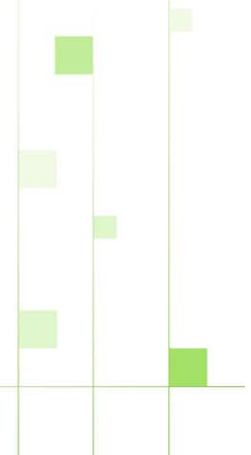


BEEF: calibration models for pH ($R^2 = 0.79$) and shear force ($R^2 = 0.60$) in beef have been successfully developed

BEEF & LAMB: combined calibration models for both beef and lamb have been successfully developed ($R^2 = 0.81$ for pH and $R^2 = 0.53$ for shear force)

BEEF: the ageing processing as well as the effect of wrapping could be followed by NIR

NIR spectra do indeed contain information related to meat quality attributes



This year's activities



1. Development of calibration model for prediction of **ultimate pH**
2. Continued work on calibration model for **tenderness** including underlying components such as shortening, connective tissue and proteolysis

One of the challenges for robust calibration models are large sample numbers with measured meat quality attributes. We aim to collaborate with Australian researcher to gain access to the large number of data collected through the Australian Beef CRC.



Acknowledgements



Foundation for Research Science & Technology –
funding under contract C10X0401

Meat & Wool NZ/Meat & Livestock Australia –
contracted under joint MQST programme

Project team:

Robert Burling-Claridge, Carrick Devine, Pete Dobbie,
Emma Fraser-Smith, Debbie Frost, Marlon dos Reis,
Dominic Lomiwes, Geoff Mercer, Mike North, Adam
Stuart, Kevin Taukiri, Eva Wiklund

