The use of technologies for carcase assessment

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Background

- Increasing demand for high quality red meat products globally
- Move towards value based supply chains needs objective measurements for carcases
- Particularly for lamb carcases
  - Traded only on weight and fat score

Carcase Traits of Interest

- Yield traits
  - Carcase weight
  - Fat depth
  - Fat distribution
- Meat Quality traits
  - Intramuscular fat
  - pH
  - Purge
  - Eating quality traits

GR Tissue Depth

- 110mm from the midline over the 12th rib
- Indicator of fatness
- Fat scores (mm)

  0 - 5 (1)

  6 - 10 (2)

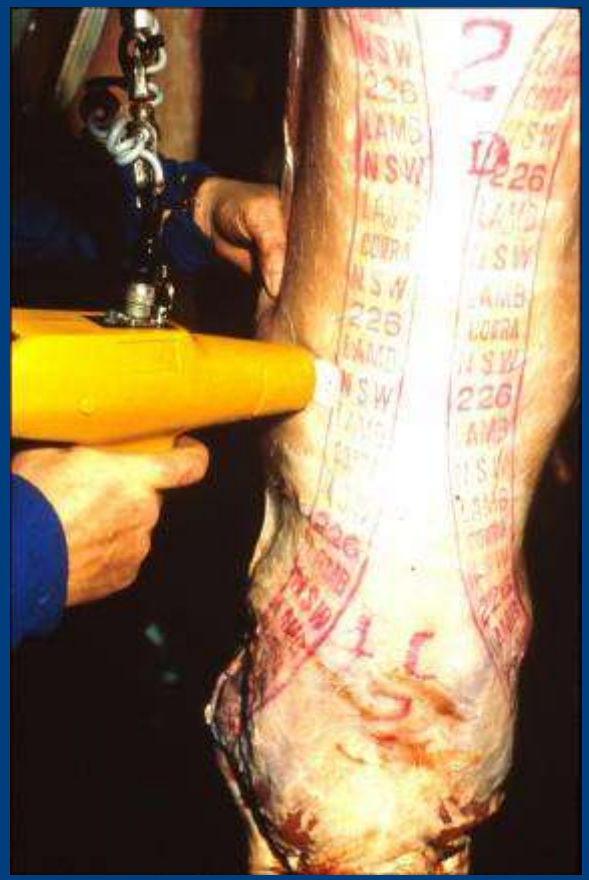
  11 - 15 (3)

  16 - 20 (4)

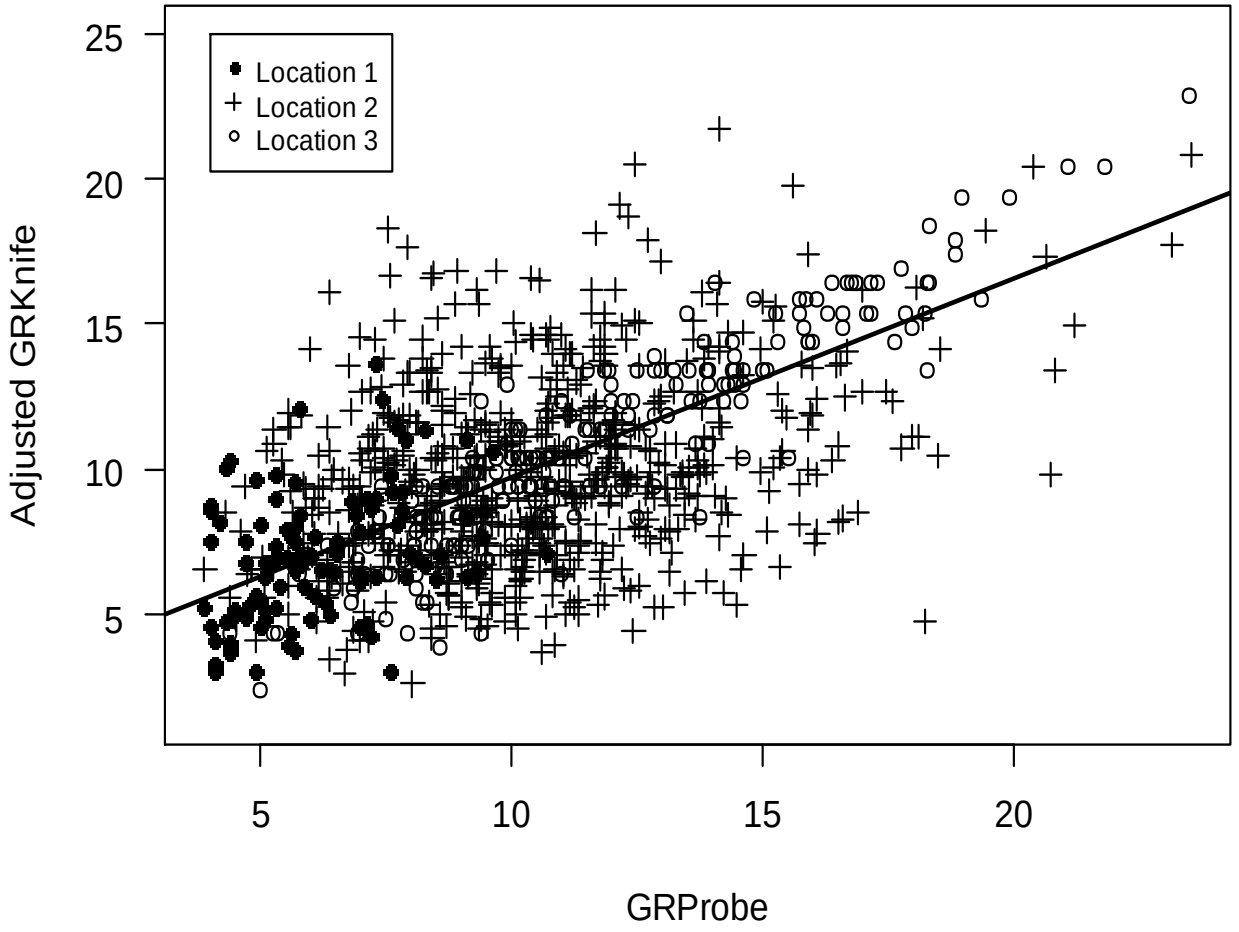
  20 + (5)

AUS-MEAT Probe

- The AUS-MEAT Probe was developed in the 1980's – 1990's
- No longer in use
  - parts have become unavailable
  - No longer serviceable



GR/Impedance



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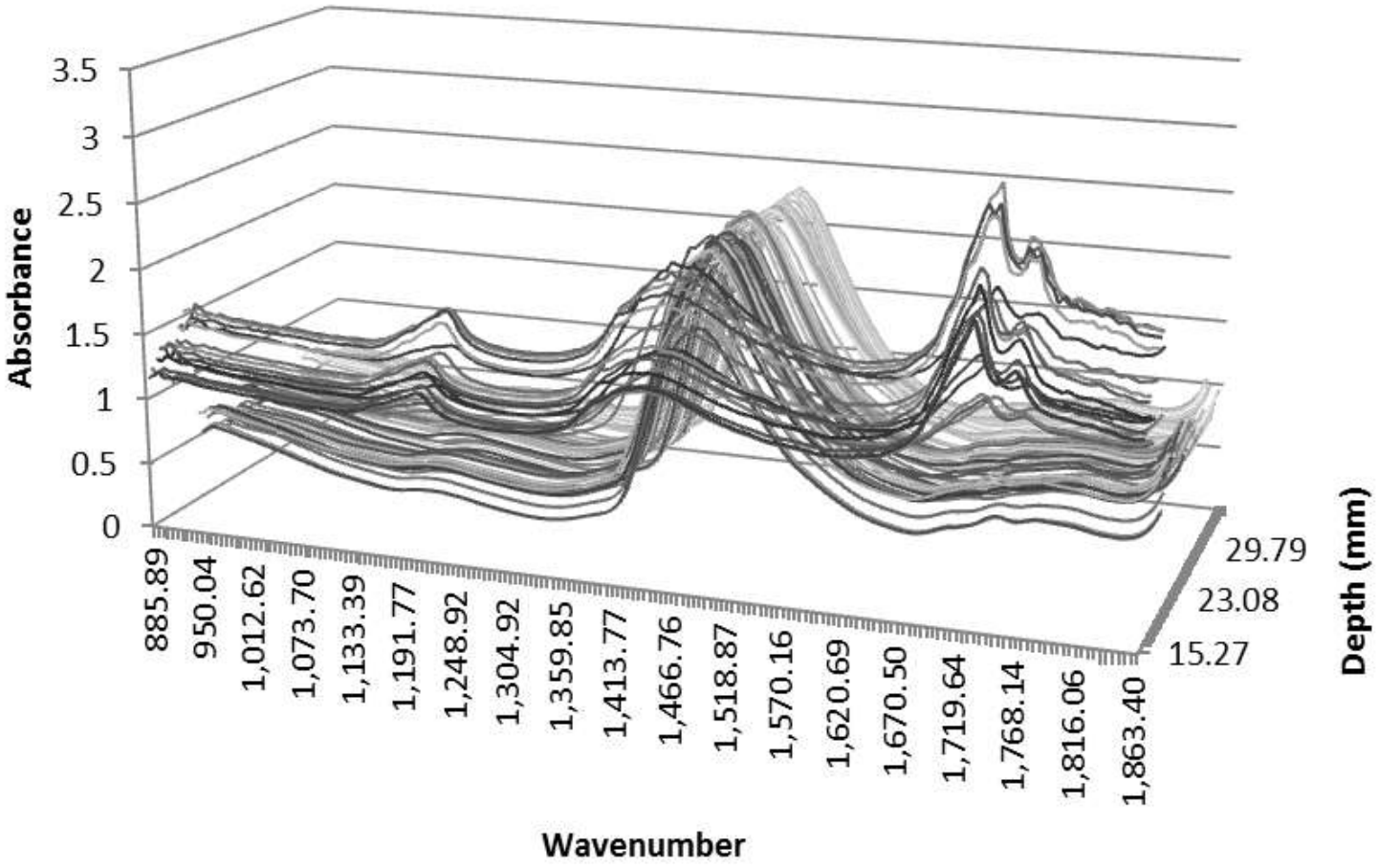
Intramuscular Fat

- Important part of eating quality
  - Contributes to tenderness, juiciness and flavour of meat

- 4% IMF is the threshold for eating quality

How do we identify carcases above the threshold?

Near Infrared (NIR)



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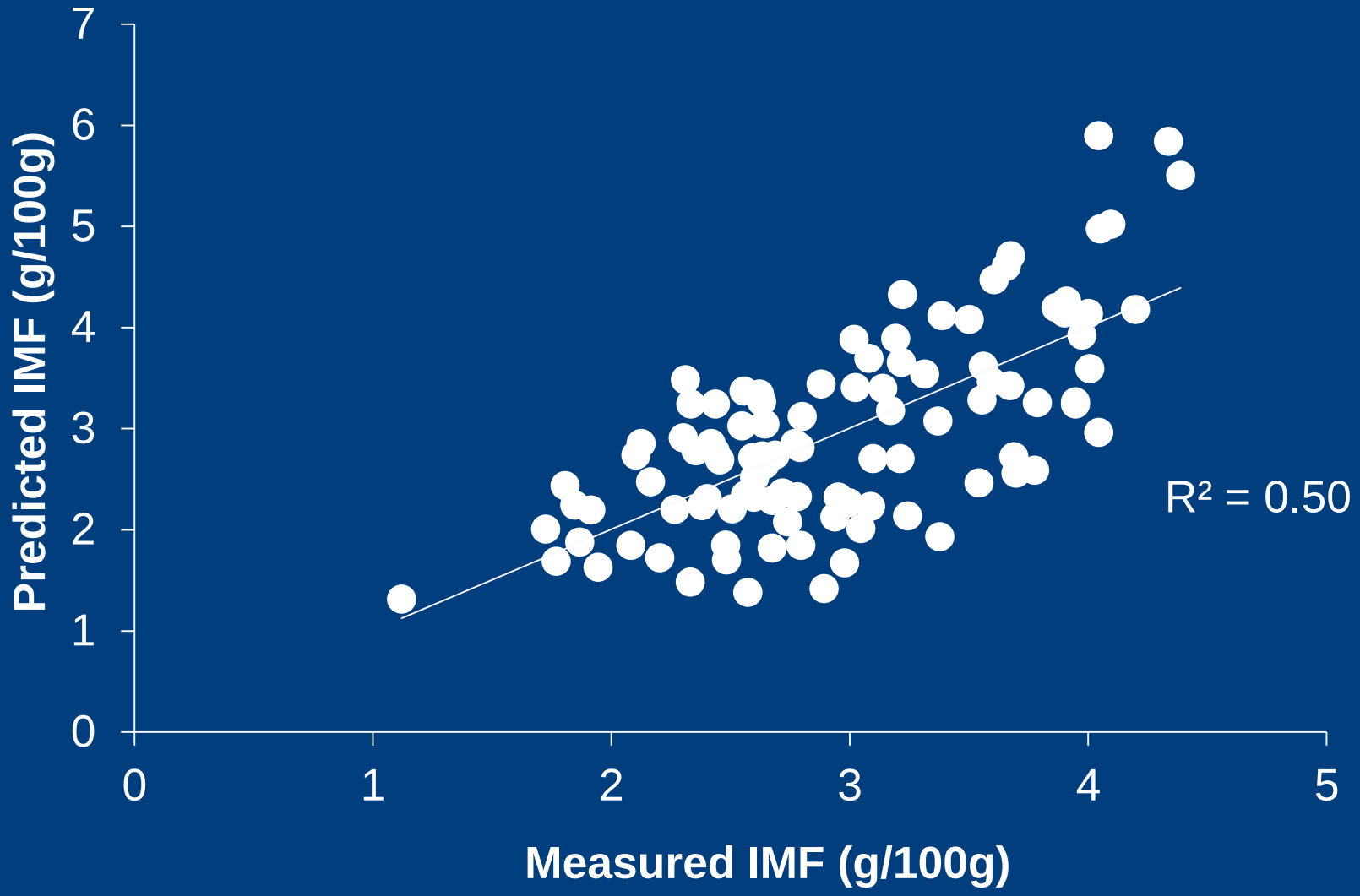
Determination of IMF with Near Infra-Red



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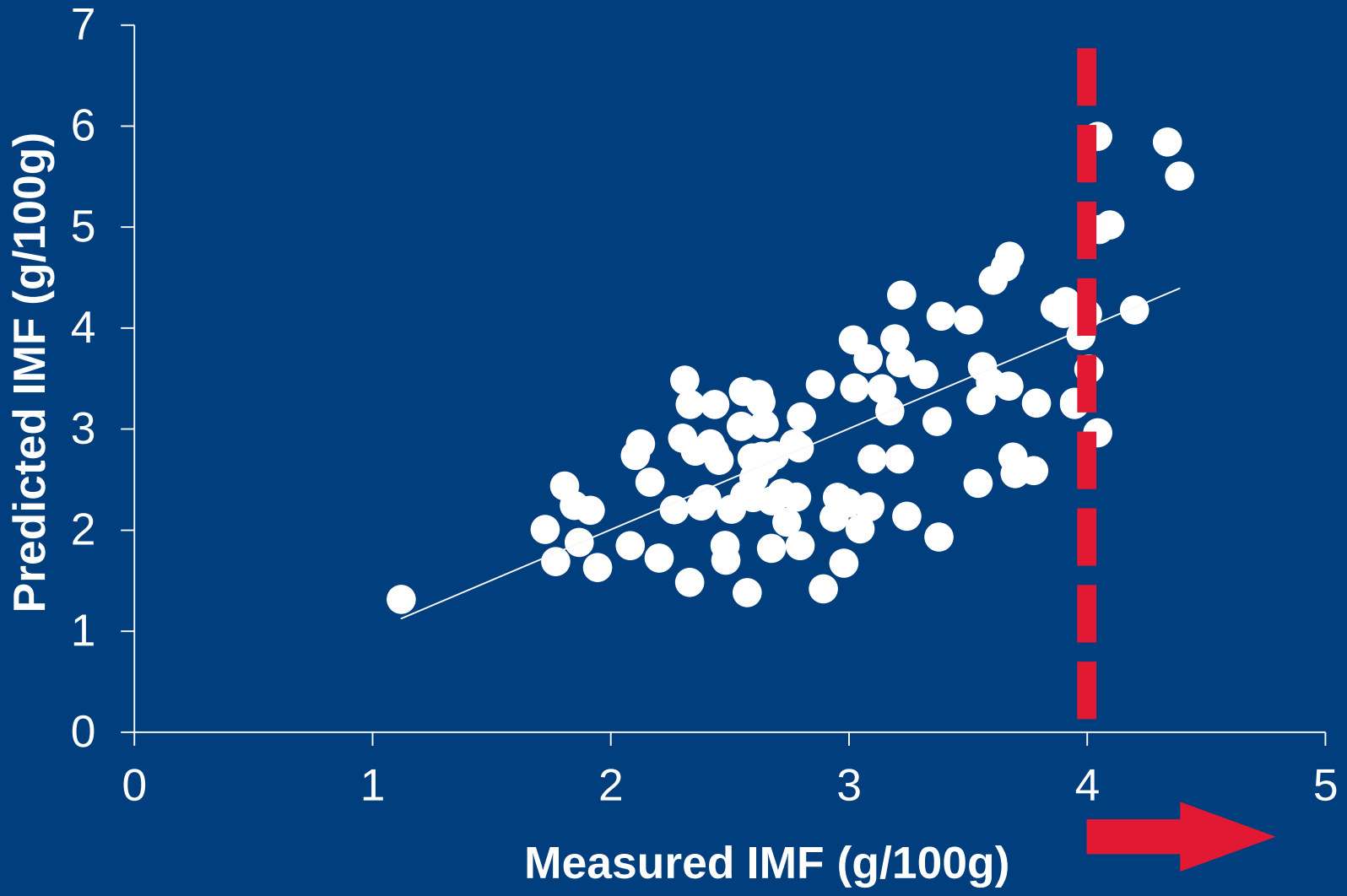

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Metabolic related Meat Quality Traits

- Determined post mortem during the conversion from muscle to meat

- pH
  - Acidity/alkalinity of the muscle
  - Impacts on colour, microbiology, tenderness

- Purge
  - Fluid drawn out of the product during vacuum packaging
  - Impacts on microbiology, consumer and retailer acceptance

Eating Quality Traits

- Tenderness
  - Soluble collagen
  - IMF
- Juiciness
  - IMF %
  - Protein structures
- Flavour
  - Fatty acid profile
  - protein and lipid oxidation

Raman Spectroscopy

- Scattering light to provide “chemical fingerprint”

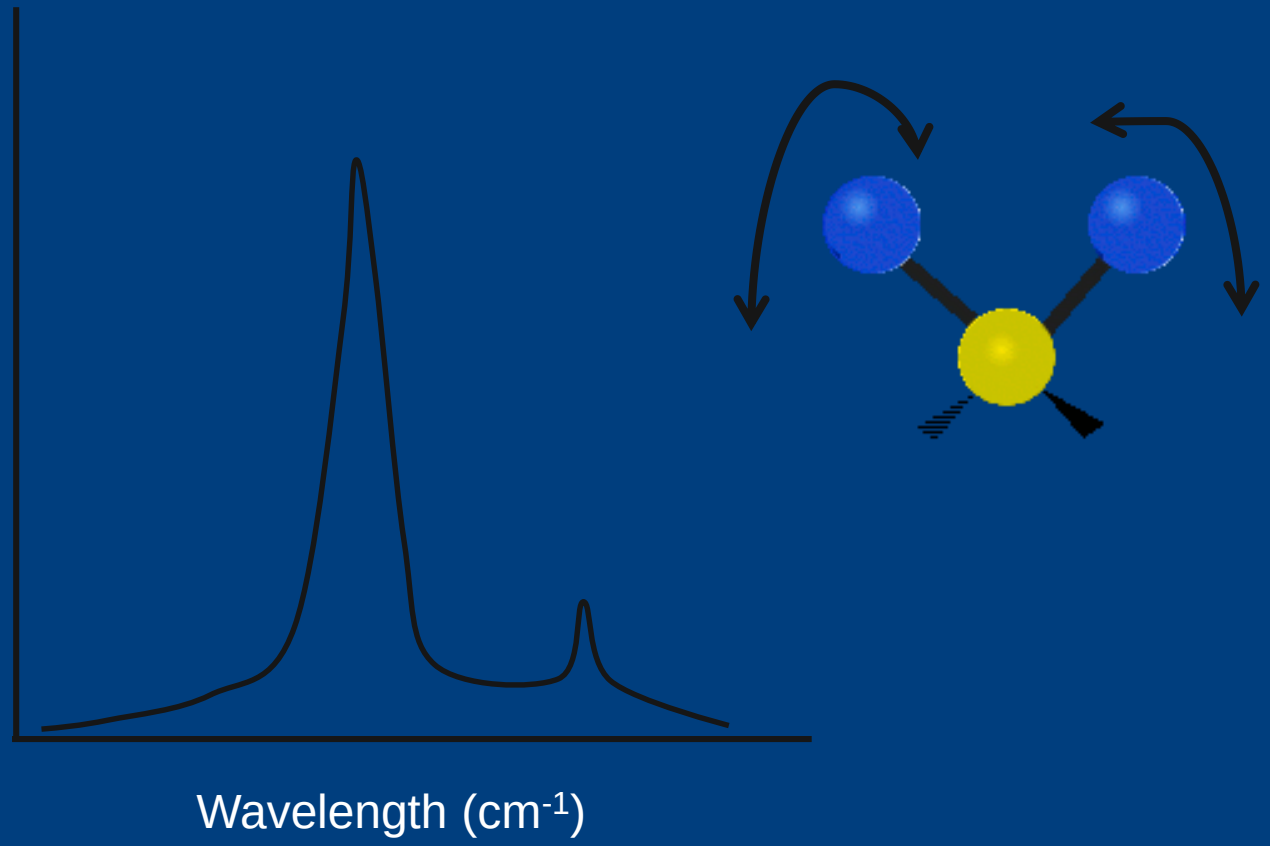

Fig.2. Example chemical vibration and Raman Spectra.

Raman Spectroscopic Device

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Raman Spectroscopy

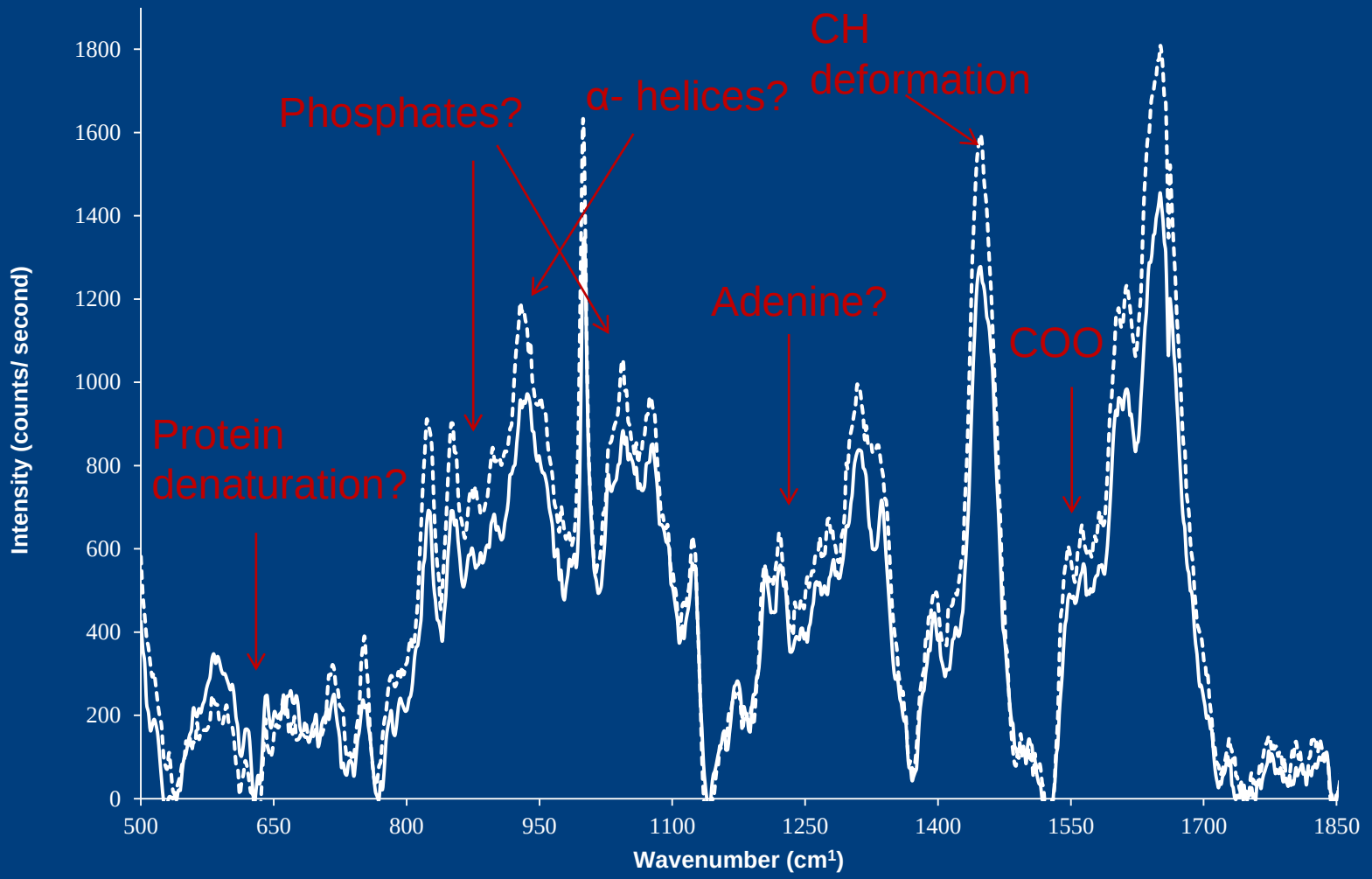
Research in Lamb

- Meat Quality Traits measured:
  - Shear force
  - Cooking loss
  - pH (24 h and ultimate)
  - Sarcomere length
  - Particle size (24 h and 5 d)
  - Histology
  - Collagen (total and soluble)
  - Purge
  - Colour (*L**, *a** and *b**)
  - Intramuscular fat and Fatty acid composition

Results

- Meat Quality Traits measured:
  - Shear force
  - Cooking loss
  - **pH (24 h and ultimate)**
  - Sarcomere length
  - Particle size (24 h and 5 d)
  - Histology
  - Collagen (total and soluble)
  - **Purge**
  - **Colour** (***L****, *a** and *b**)
  - **Intramuscular fat and Fatty acid composition**

Spectra Purge



The averaged and background corrected spectra collected at 24 hours post mortem from the ovine *m. semimembranosus* with the 5 highest (4.65 – 6.42; solid) and lowest purge (1.10 – 1.23; dotted).

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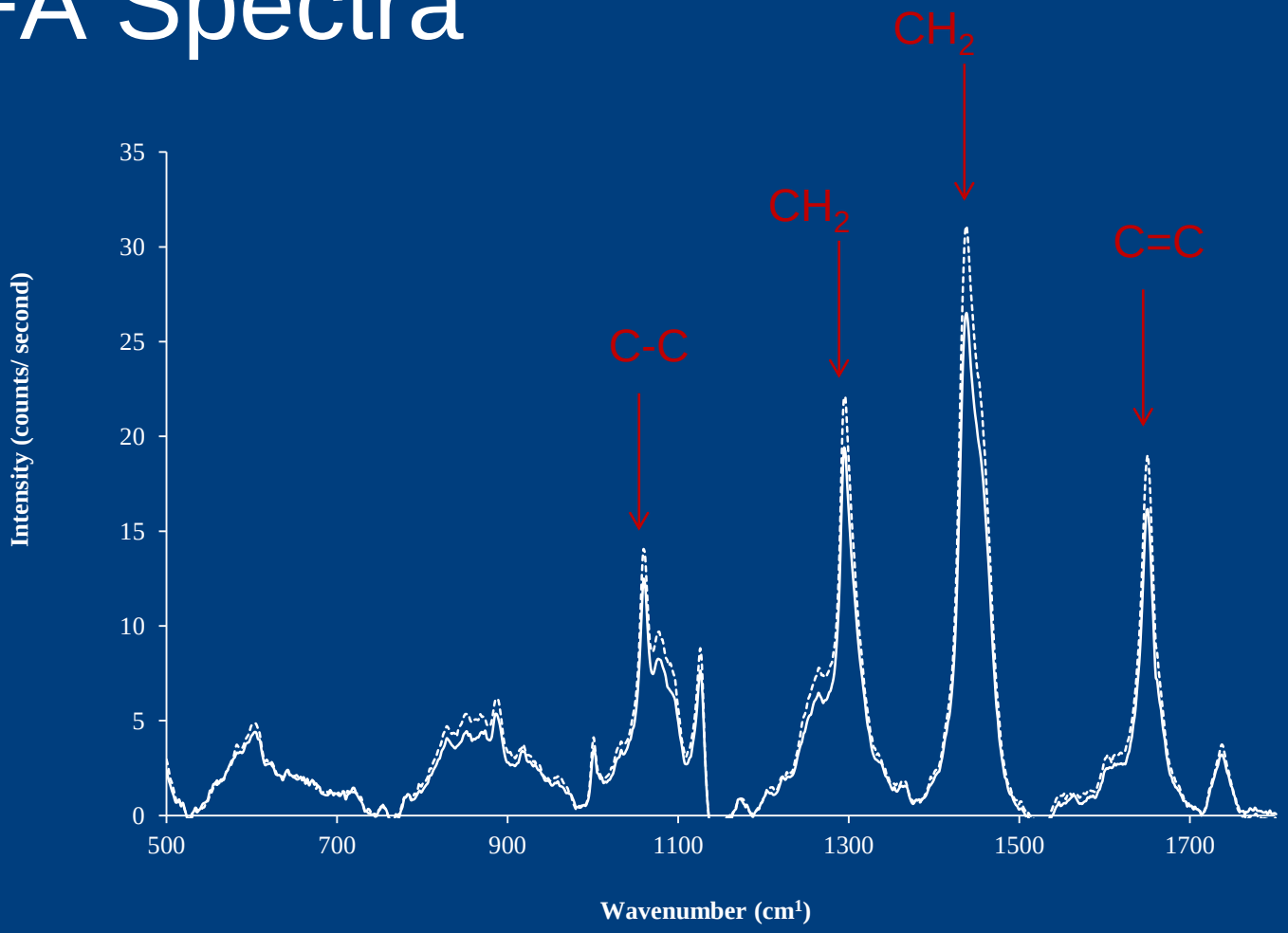
PUFA Spectra



Baseline corrected, normalised and averaged Raman spectra of the 5 samples with the most PUFA (dotted line; 432.28 – 477.25 mg/100g meat) compared to the 5 samples with the lowest PUFA (black; 235.70 – 255.73 mg/100g meat).

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Research in Beef

- Prediction of beef sensory quality
  - Tenderness
  - Juiciness
  - Flavour
  - Overall liking

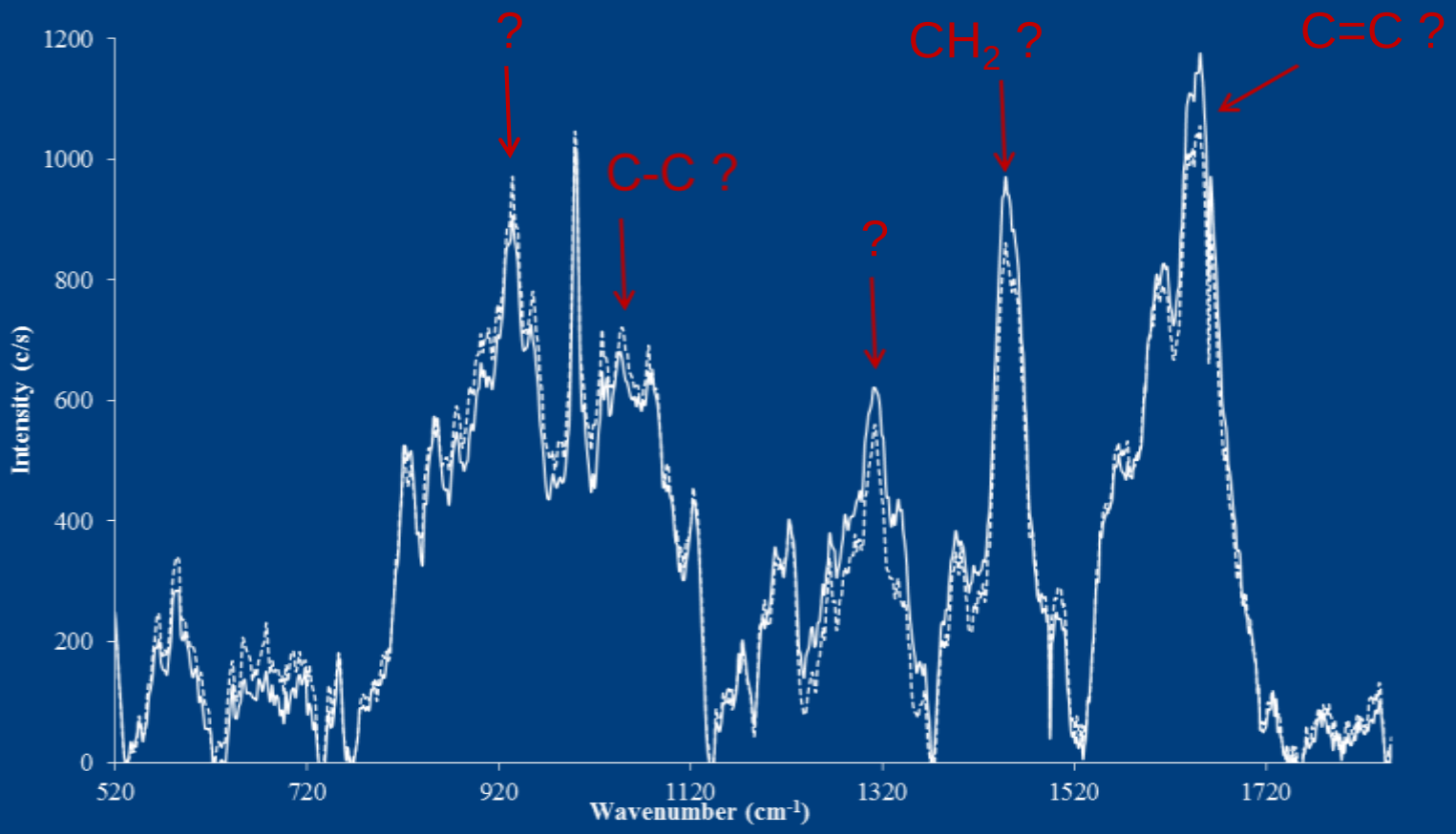
- Prediction of Meat Quality traits
  - Shear force
  - Purge
  - pH

Results

- Prediction of beef sensory quality
  - Tenderness (R^2 = 0.60)
  - Juiciness (R^2 = 0.65)
  - Flavour
  - Overall liking

- Prediction of Meat Quality traits
  - Shear force
  - Purge
  - pH (R^2 = 0.12)

Spectra Sensory Juiciness



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Raman Spectroscopic Device

Conclusions

- Development of technologies for carcase assessment is key to providing mode information to consumers and producers
- Further research will continue to focus on GR tissue depth and IMF
- Continue to develop emerging devices to complement current grading systems