



Welcome to Q-PorkChains Seminar



Rapid sorting for Pork Quality with NIRS

PhD project

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- Christiaan Kapper
 - PhD project on fresh pork quality
 - VION Food Group and CCL Nutricontrol
 - Wageningen University

 - Q Pork Chains module 4





Overview

- **Part 1. Meat Quality, Water Holding Capacity (WHC)**
- **Part 2. Measuring meat quality**
- **Part 3. Research project**



Meat Quality

Sensory and technological quality:

- Appearance (colour, drip loss)
- Eating Quality (tender, juicy, taste, etc.)
- Suitability for further processing

These factors are all related to one key parameter:

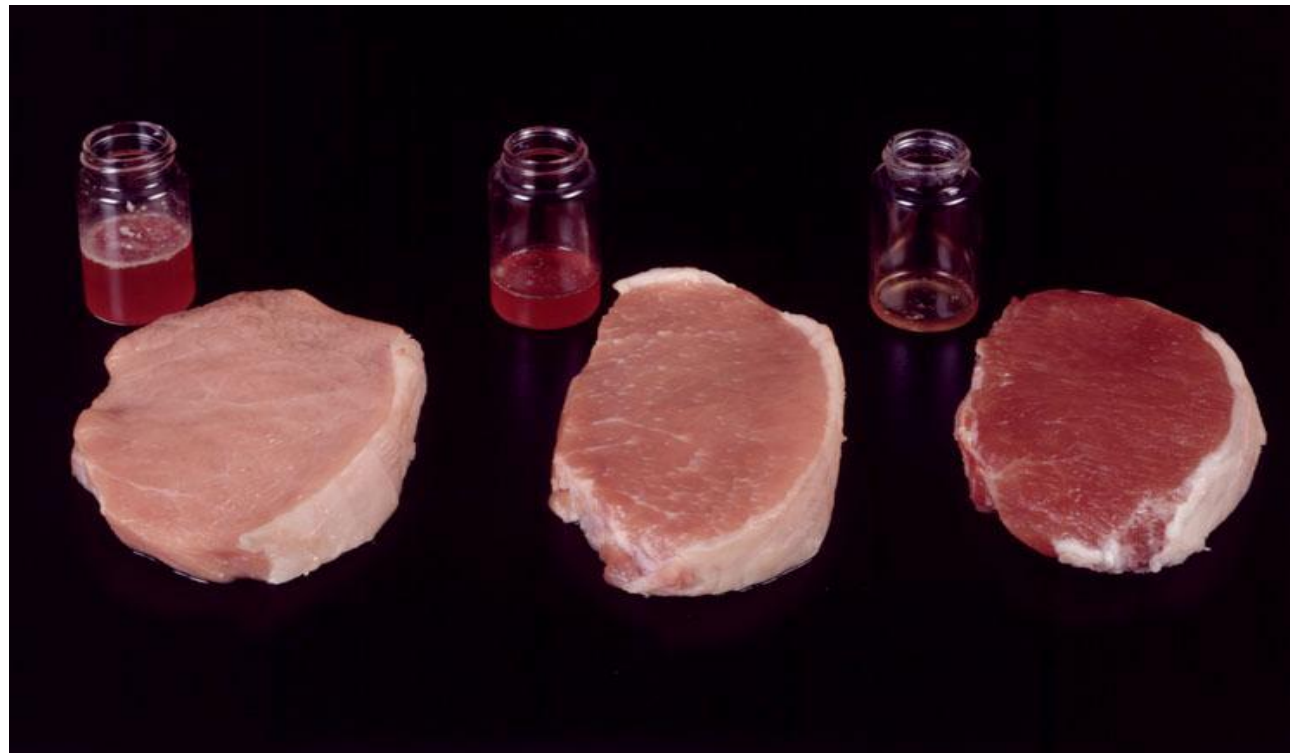
WHC



Low

WHC
Medium

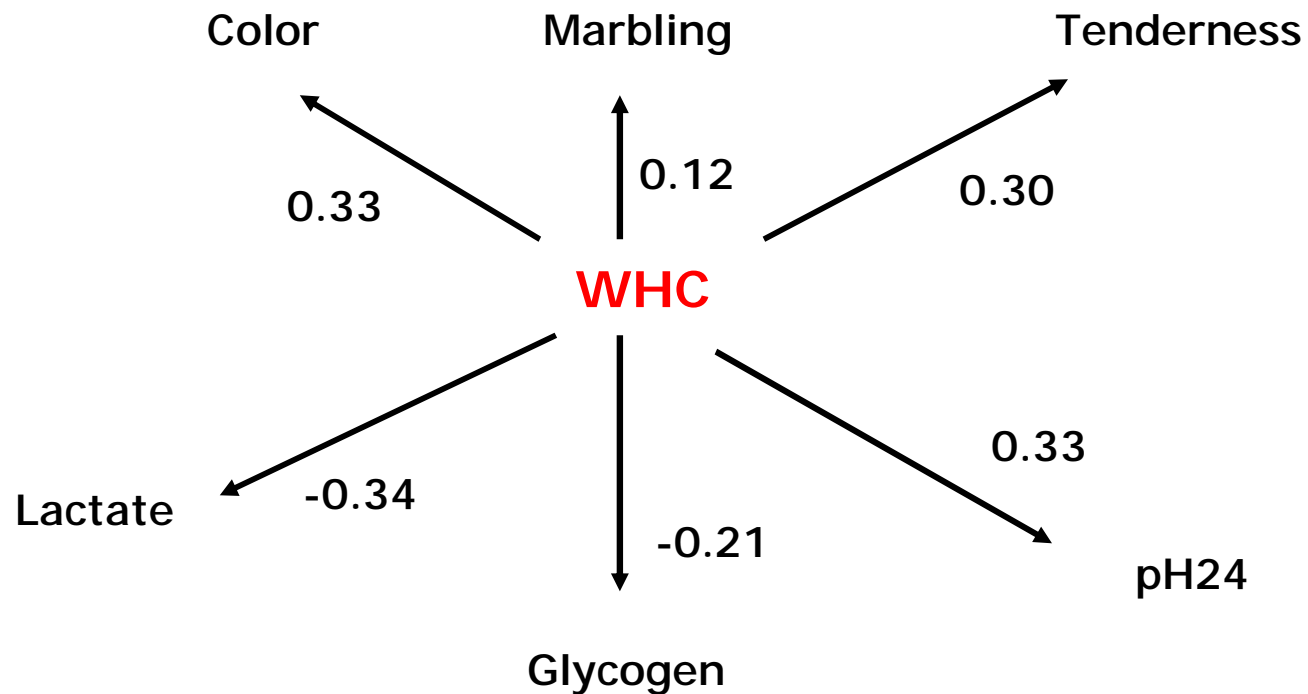
High



F. Mc Keith, Iowa State University



WHC and parameters



Correlations are significant

Huff-Lonergan et al., 2002



WHC, pHu and Cooking Yield

WHC	pHu class	Technological Yield (%)
Low	PSE	90.35
	< 5.5	91.95
medium	5.5 - 5.6	95.85
	5.6 - 5.7	98.05
	5.7 - 5.85	99.94
High	> 5.85	101.70

Cariou, 1988 (cooked ham, Phosphate free)

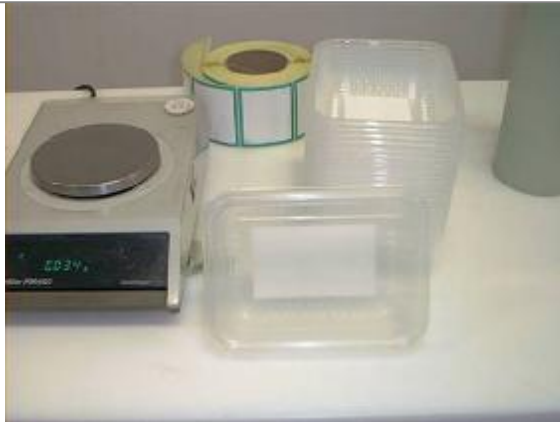


Overview

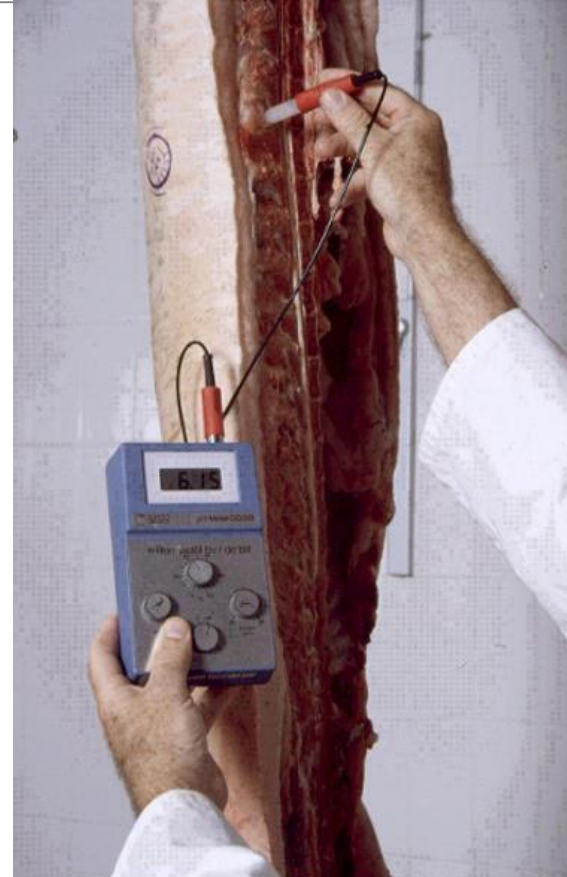
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Measurement of WHC (current)



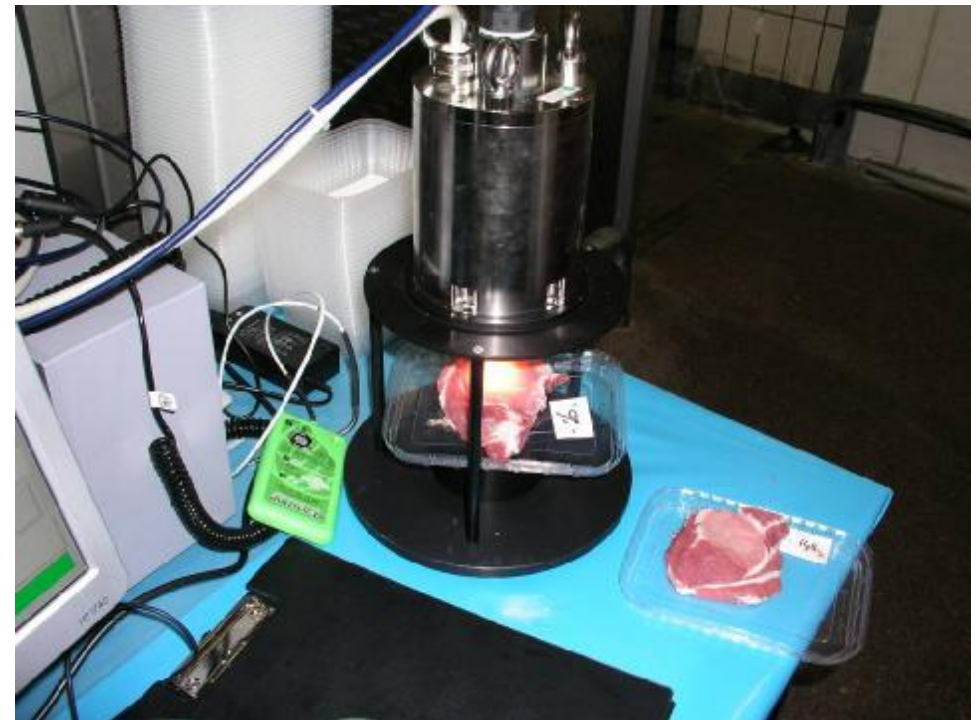
Retail tray method



pH measurement

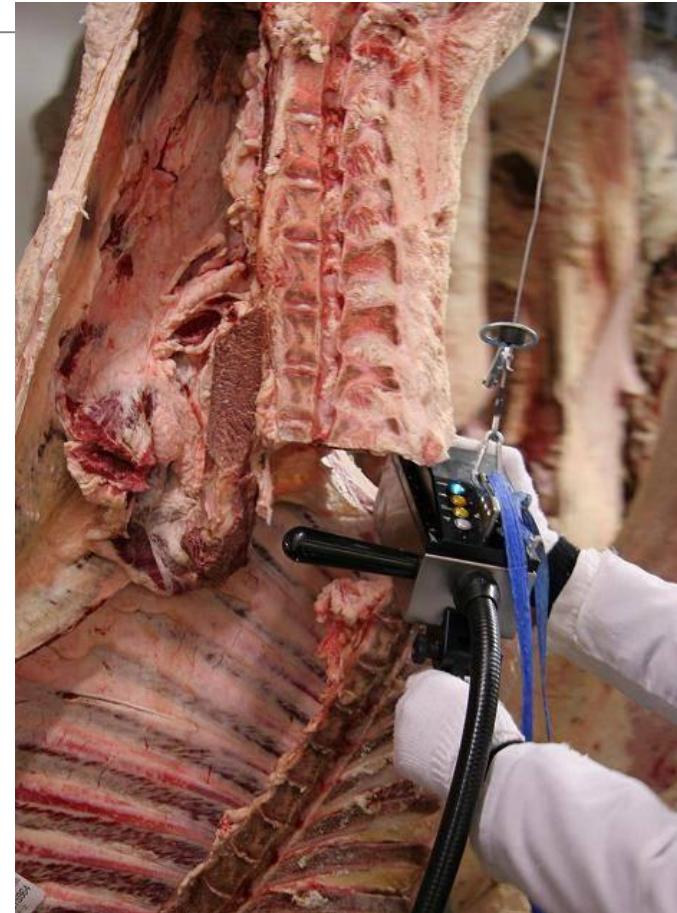


NIRS device (new), WHC?





NIRS Tenderness beef (currently used)



(<http://www.asdi.com>, USA)

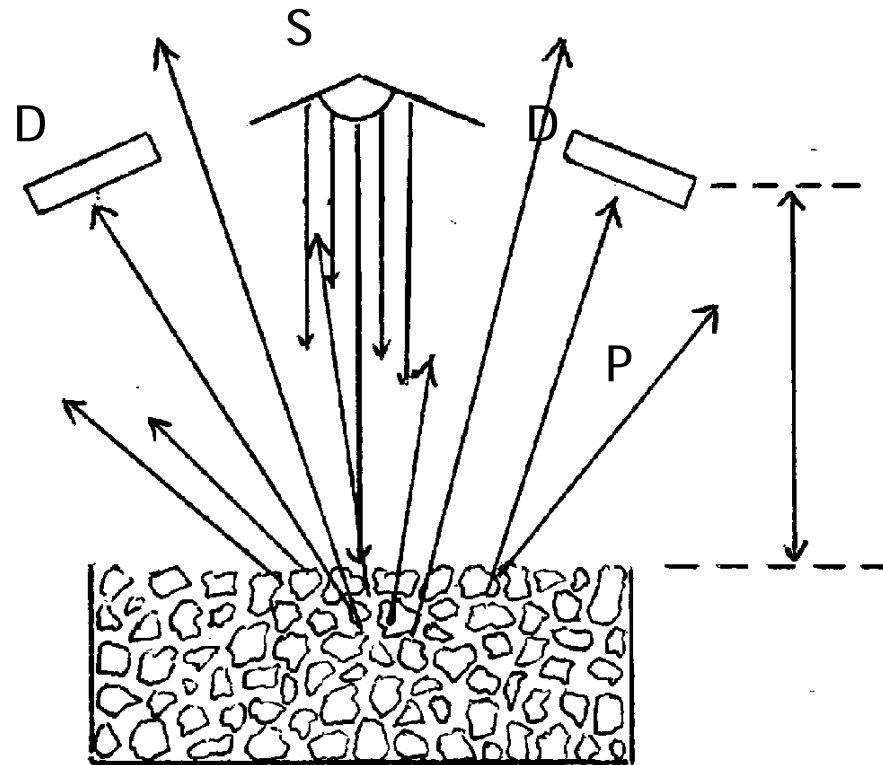


What is NIRS? How does it work?

- 1970's Near infrared spectroscopy developed
- Specific energy (light) can be absorbed by chemical bounds
- Measuring absorption gives information
- NIRS on wheat, milk, minced meat very successful



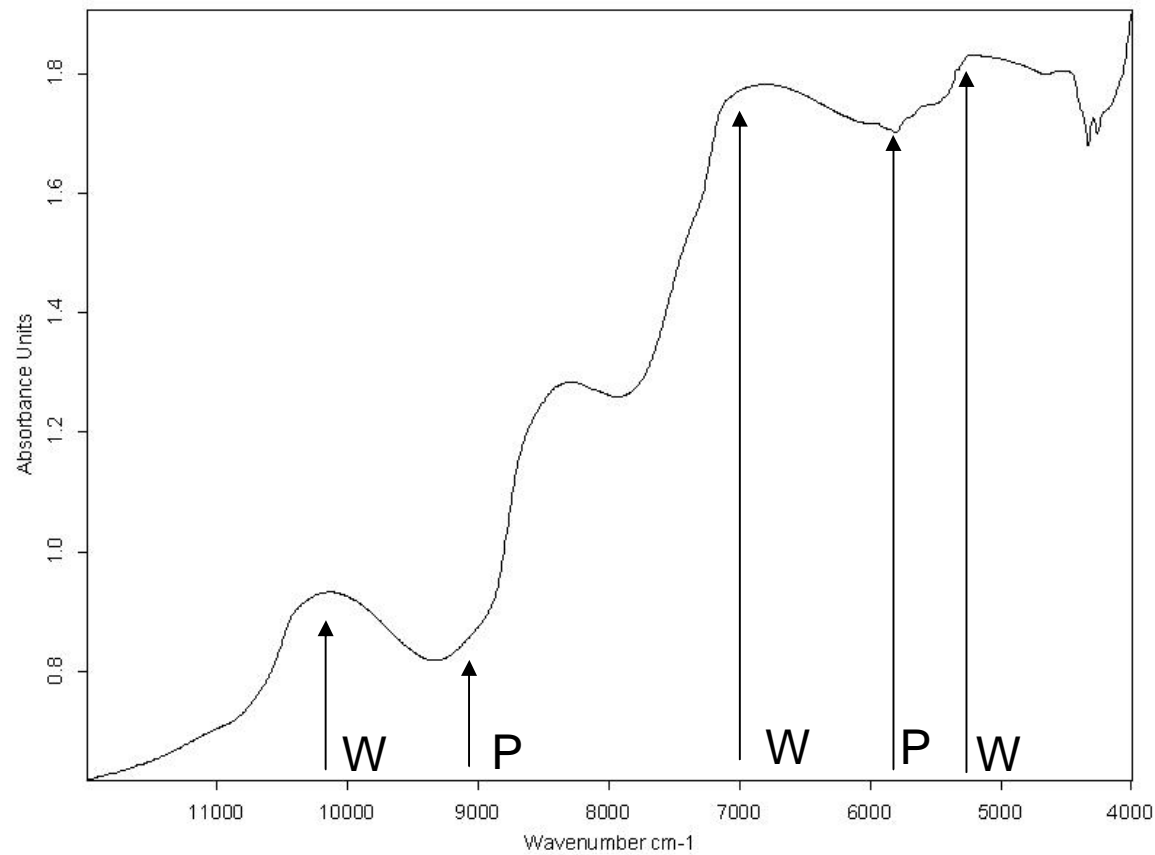
What is NIRS? How does it work?



S = light source D = Detector; P = Pathlength



Pork absorbance spectra



W = water, P = protein



Spectra and model development

- Spectrum can be linked to measured parameters, like WHC
- Variation parameters important
- Calibration
- Prediction model can be generated



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My research project

- **Research aim is to investigate fast and non-invasive WHC prediction on fresh pork in the cutting area of a slaughterhouse**
- **Use Near Infrared Spectroscopy (NIRS)**



What has been done?

- Literature research
- What has been done, can NIRS be used?
- Practical experiments lab + slaughterhouse





Setup feasibility

- Experiments practical application (lab scale)
- Intact meat, repeatability (lab scale)
- Speed, accuracy (slaughterhouse)





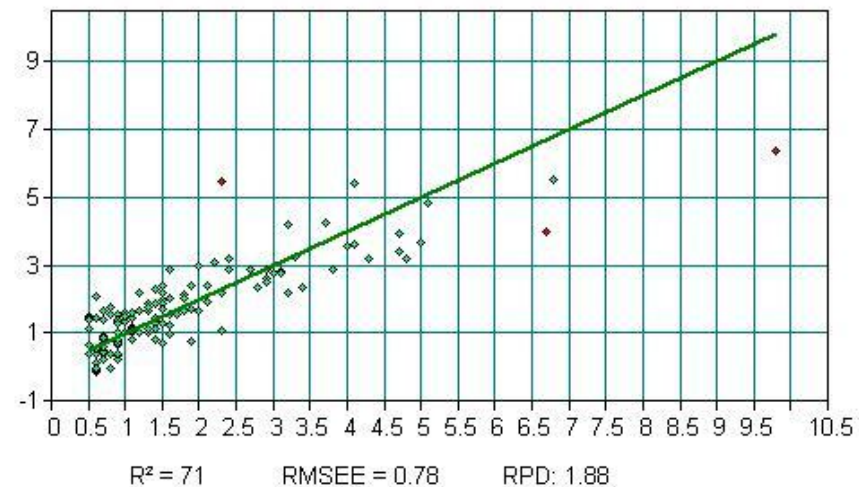
Offline measurements





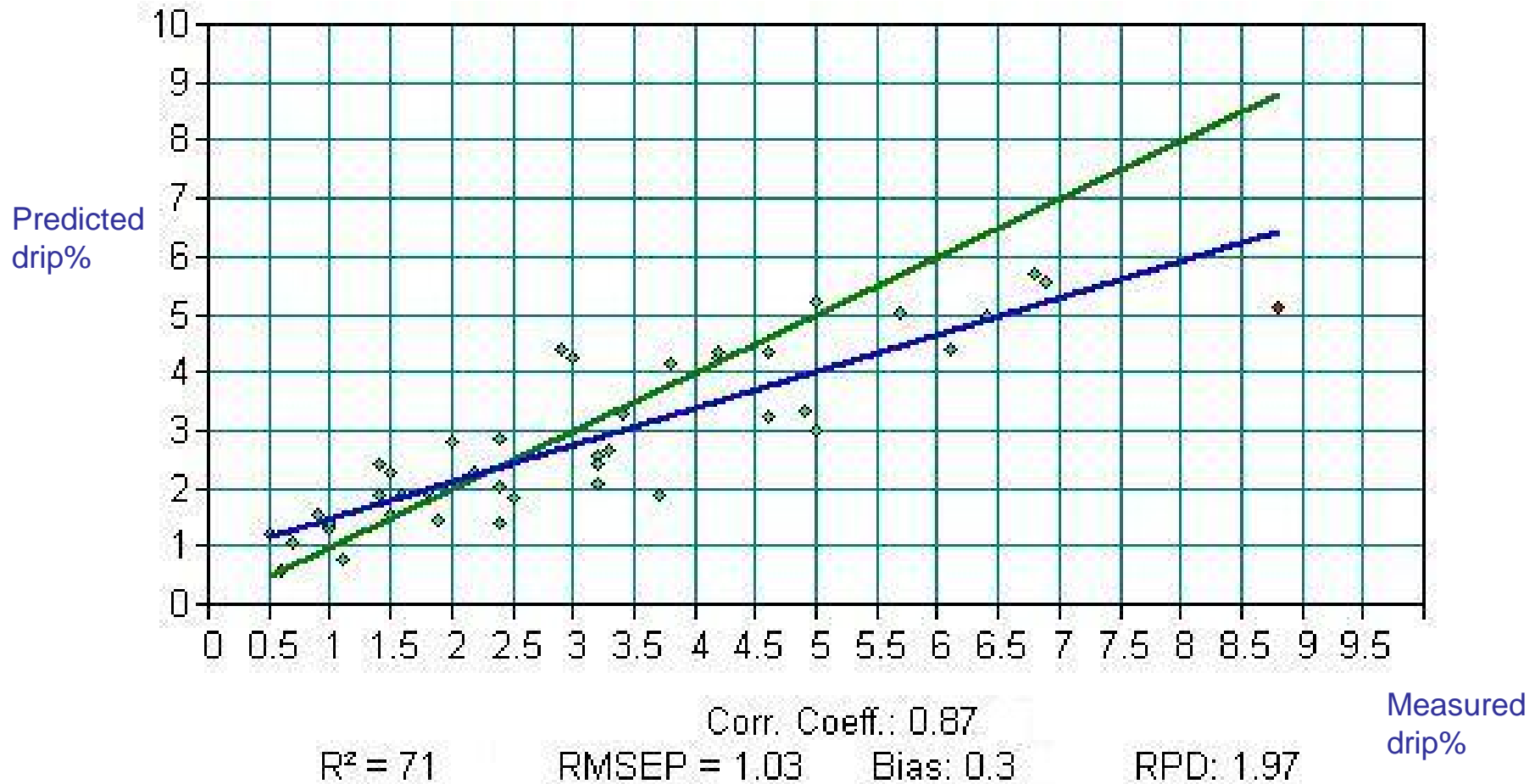
Preliminary results; Calibration data

- Calibration performed on 193 carcasses
- One slaughterhouse, one day
- Spectra linked to drip loss%
- Cross validation
- $R^2 = 0.71$
- $RMSEE = 0.78$





Preliminary results; validation data

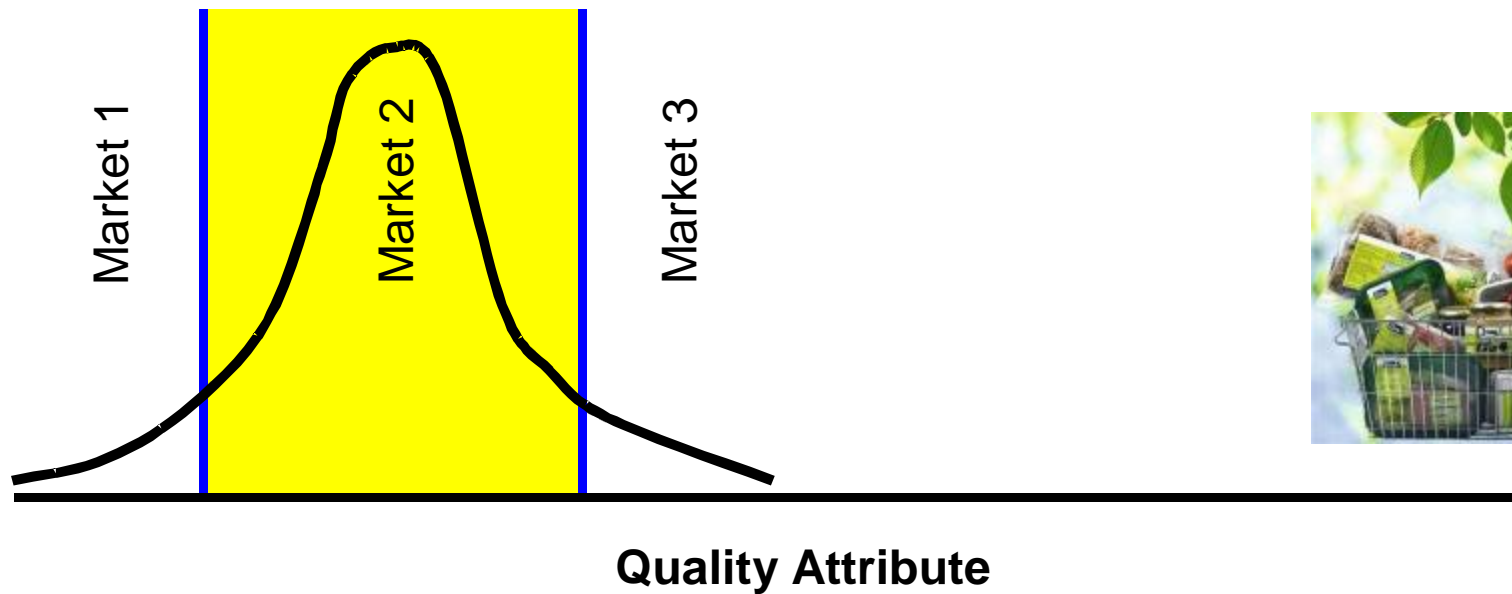




Rapid sorting for Pork Quality with NIRS

The “Niche” Market Model

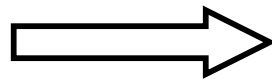
- Target specific market
- Willing to adapt to meet customer requirements



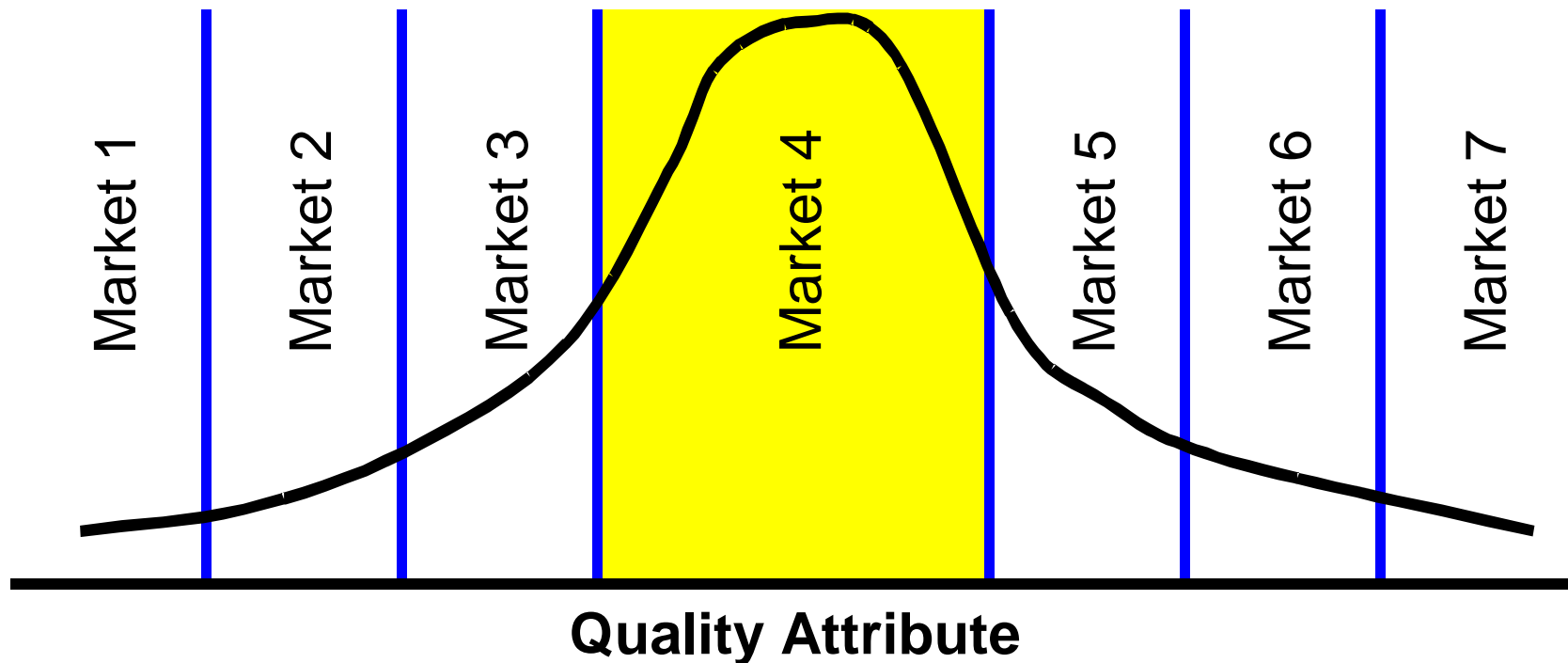


Large Scale Model

Sorting for markets by making use of the variation



NIRS can be a valuable tool





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Thank you for your attention

