

Computer Tomography and Near Infrared Spectroscopy show substantial potential to predict beef carcass and meat quality

Programme 2

- Control of Viral Diseases
- Control of Bacterial Diseases
- Control of Parasitic Diseases
- Livestock Welfare
- Livestock Genetics

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Background

- Efficiency of red meat production and marketing is reduced by a lack of objective, practical and accurate techniques for measuring carcass and meat eating quality.

- Sophisticated measurement techniques to predict quality were identified:



X-ray Computed Tomography (CT), which is a very accurate way to measure carcass composition and muscularity in sheep but has not been tested in beef carcasses.



Near Infrared reflectance spectroscopy (NIR) that may be an effective tool to predict meat eating quality traits such as tenderness, juiciness, and flavour.

Aims and Objectives

- Investigate techniques for predicting beef and lamb carcass and meat eating quality from live animal and carcass measurements.

The objective of this specific study are to:

- Investigate the potential of CT to measure the weights of fat, muscle and bone of beef primal cuts and total carcass composition.
- Explore NIR as predictor of beef eating quality.

Policy Relevance

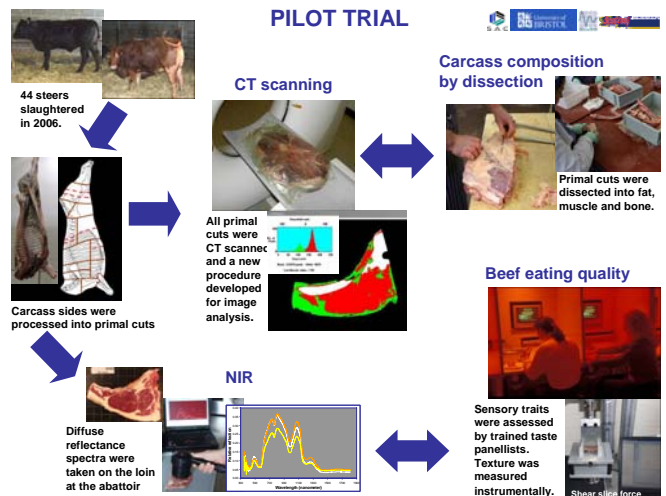
- Beef cattle and sheep production make up approximately 40% of Scottish Agricultural output.

- Management of both these livestock sectors has a major impact on:
 - the biodiversity of Scotland's natural habitats,
 - the sustainability of Scotland's rural economies, and
 - the nature of Scotland's unique landscapes which in turn are critical to Scotland's tourism sector.

- Rapid, cheap, effective and impartial measures of meat eating quality are needed to support the marketing of Scotland's high quality beef and lamb produce, both at home and internationally.

Relevance to Cross-Cutting Themes

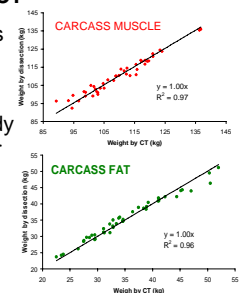
CCT 1: Responding to Climate Change	★ ☆ ☆
CCT 2: Protecting Biodiversity	★ ★ ☆
CCT 3: Environmental, Social and Economic Sustainability of Rural Scotland	★ ★ ★



Progress to Date

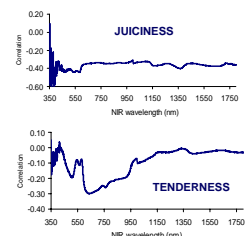
Primal cut and carcass composition by CT

- An automatic and fast image analysis was developed to calculate tissue weights of primal cuts from CT scans.
- The high accuracies found in the first study were validated in another subset of data for both primal cut and carcass composition.
- This technique may reduce costs and time of measuring carcass composition in large number of animals, as required in breeding programmes and for the validation or calibration of other indirect techniques of assessing carcass quality.



NIR and beef eating quality

- NIR measurements taken 48h post-mortem showed significant correlations (max 0.44 at 584 nm) with juiciness assessed by a trained taste panel on meat samples aged for 14 days.
- Tenderness showed significant correlations (max 0.29) with NIR measurements.



- Results support the use of on-line NIR in the abattoir for earlier, fast and relatively inexpensive estimation of beef meat eating quality.

- Additional data were collected on 150 steers and heifers slaughtered in 2007/08.

Acknowledgements

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