Investigations Into the Potential of Video Image Analysis (VIA) and Computerised Tomography (CT) on Live Animals and Carcasses in Beef and Sheep

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 the whole red meat chain is reduced by the lack of objective, practical and accurate measurements of carcass quality
- Video Image Analysis (VIA) on live animals and/or their carcasses may provide consistent and accurate measures of carcass composition in the abattoir
- In addition, online VIA information may be used for breeding purposes
- Research is necessary to test and calibrate the VIA technology under conditions relevant for Scotland's beef and sheep production

Aims and Objectives

The main aims of the complex project are:

- Investigation of the usefulness of VIA methods on live animals and carcasses (beef and sheep) for predicting carcass quality
- Estimation of genetic parameters of VIA traits

Policy Relevance

Beef cattle & sheep production

- ~40% of economical Scottish Agricultural output
- beef - largest sector of Scottish agriculture (~1 m cattle, ~30% of UK breeding cows)
- sheep - most common Scottish farming activity (31% of holdings). Scotland has > 20% of the UK breeding flock

Both these livestock sectors have a major impact on:

- the sustainability of Scotland's rural economies
- the nature of Scotland's unique landscapes
- the biodiversity of Scotland's natural habitats
- UK & international marketing of Scotland's high quality beef and lamb

Efficiency/profitability of the red meat chain needs:

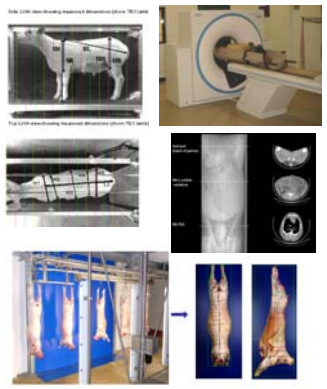
- vertical integration allowing quality assurance, carcass feedback for optimizing management and breeding
- improved Value Based Marketing Systems (VBMS) of carcass quality for which VIA may be of high importance

Relevance to Cross-Cutting Themes

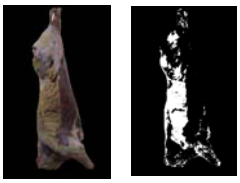
CCT 1: Responding to Climate Change	★ ☆ ☆
CCT 2: Protecting Biodiversity	★ ★ ☆
CCT 3: Environmental, Social and Economic Sustainability of Rural Scotland	★ ★ ★

Material and Methods

VIA and CT SHEEP



VIA CATTLE



Progress to Date

SHEEP

Use of VIA/CT on live sheep:

- Live weight, muscle and fat weights predicted with high accuracy
- Intramuscular fat (IMF) predicted with moderate to high accuracy
- Breed differences in prediction accuracy of muscle, fat, IMF and bone
- Optimal image locations have been identified

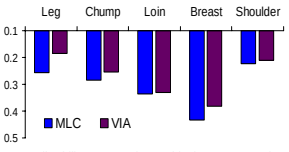
CATTLE

Use of VIA on live beef cattle:

- Initial results confirm that VIA cameras mounted above the water trough can take suitable VIA images
- Dimensional and area measurement of live beef cattle can be derived from these VIA images for predictive purposes
- This live beef cattle VIA work is being continued as part of a Feasibility LINK programme

SHEEP CARCASSES

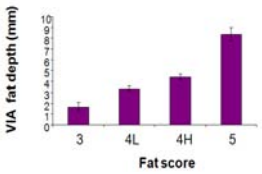
- VIA system is a fast and non-invasive method to predict weights of carcass joints with high accuracy and precision



Predictability measured as residual mean squared error (smaller value means better prediction)

- Genetic parameters of VIA traits (e.g. loin $h^2 = 0.26$) suggest potential for use of VIA in breeding programmes

CATTLE CARCASSES



- Preliminary results show that carcass composition can be extracted successfully from images taken in the abattoir
- Estimates of fatness by VIA show reasonable correlation with subjective EUROP grid fat grade ($R^2 = 0.52$)

Acknowledgements

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