Smart Dairy Production

Professor Richard Dewhurst
SRUC: Dairy Research Centre

Agri-EPI Centre Ltd

Leading the way in Agriculture and Rural Research, Education and Consulting

Outline of talk

- Introduction to Agri-EPI Centre Ltd
  - UK AgriTech Centres
  - Innovation Hubs
  - Satellite farms
  - Dairy Development Centres

- Smart Dairying capability at SRUC
  - Adult cattle
  - Calves
  - GHG emissions

Agri-tech Innovation Strategy

- £150 million funding stream from BEIS; managed by Innovate UK

- £70 million project funding ('catalyst')

- £80 million for 'Centres for Agricultural Innovation'

We work with
Innovate UK

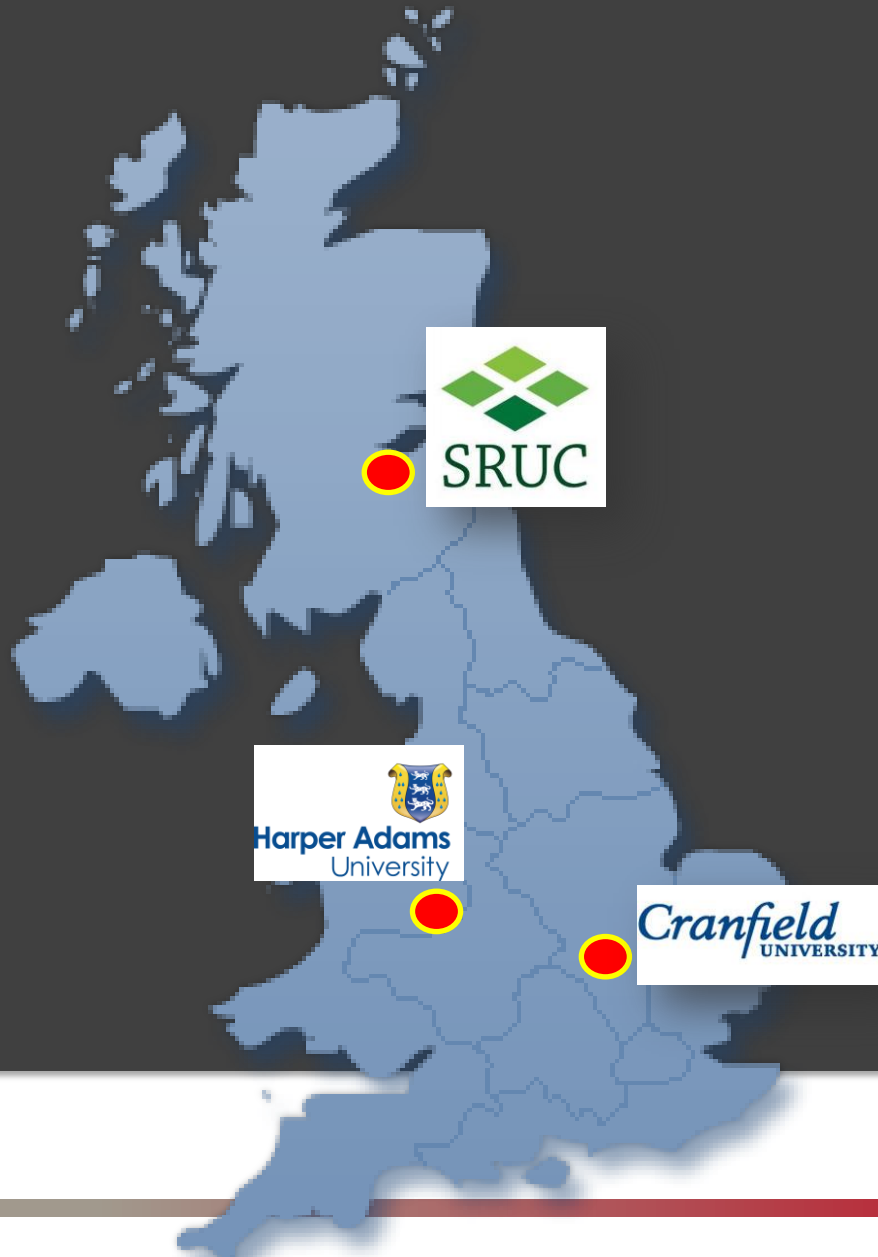AGRI**EPI**CENTRE
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Centres for Agricultural Innovation

Agri-EPI Centre: What is it?

Agri-EPI Centre focuses on the delivery of research, development, demonstration and training on <u>precision agriculture</u> and <u>engineering</u> for the livestock, arable, horticulture and aquaculture sectors.

Agri-EPI Centre – Hubs

Northern Hub (Easter Bush)

- Opens late 2019

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Western Hub (Harper Adams)

- Opened 2017

Tenants "TAFE", (£20 billion T/O business) from India, testing the water with a UK base

Southern Hub (Cranfield)

- Hub construction underway – glasshouse and sensor platform operational

Satellite farms

- 28 satellite farms established

- Small meeting rooms

- 'Precision' technology appropriate to the farming sector

- Demonstrate and evaluate precision technology

- Collect data from high-performing real farms

Dairy Development Centres
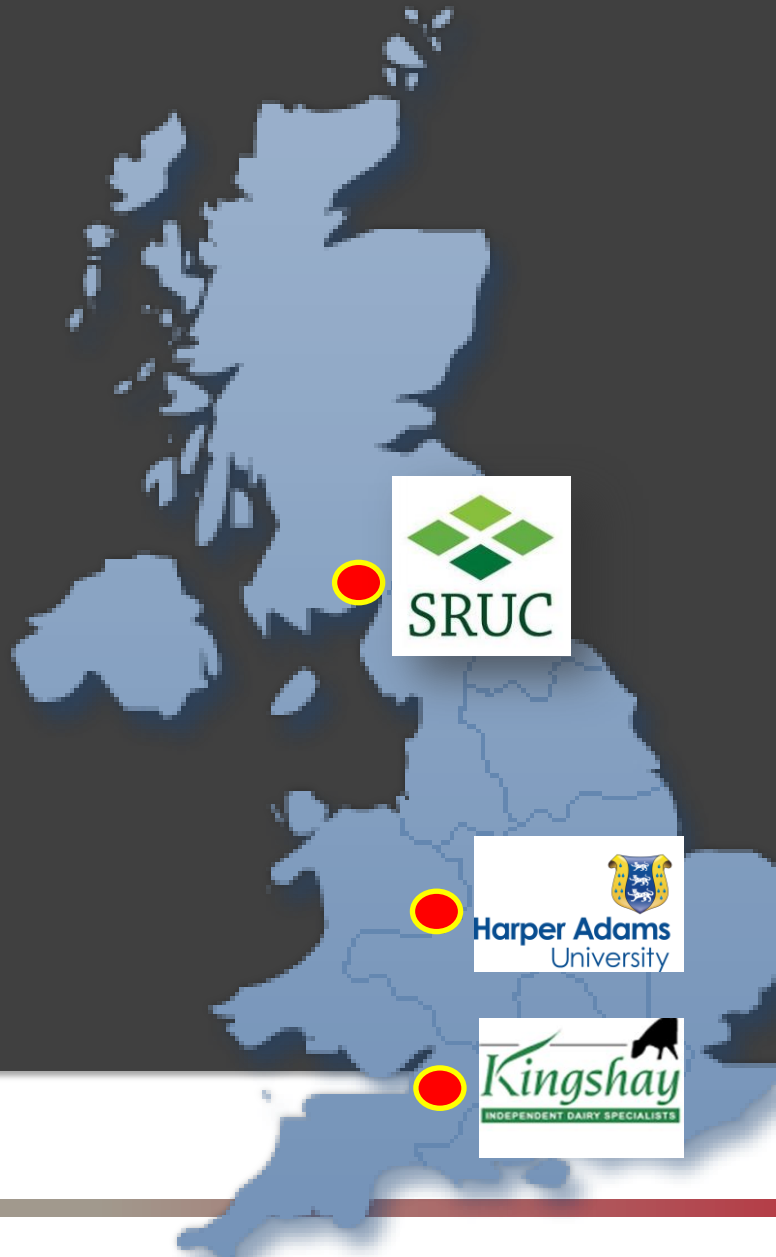
Somerset (Kingshay)

Shropshire (Harper Adams)

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Dumfries (SRUC)

Calf facilities at Dumfries

- Individual recording of:
  - Milk intake
  - Water intake
  - Concentrate intake
  - Forage intake
  - Live weight
- Other equipment for monitoring calves and their environment

Calf projects

- Milk feeding and weaning strategies

- Precision monitoring technologies for performance, health and welfare

- Lifetime trajectories of animals (intake, growth) – both for dairy and dairy-beef; mechanisms (epigenetics)

- Adding detail to database for Langhill animals

A vision around variance
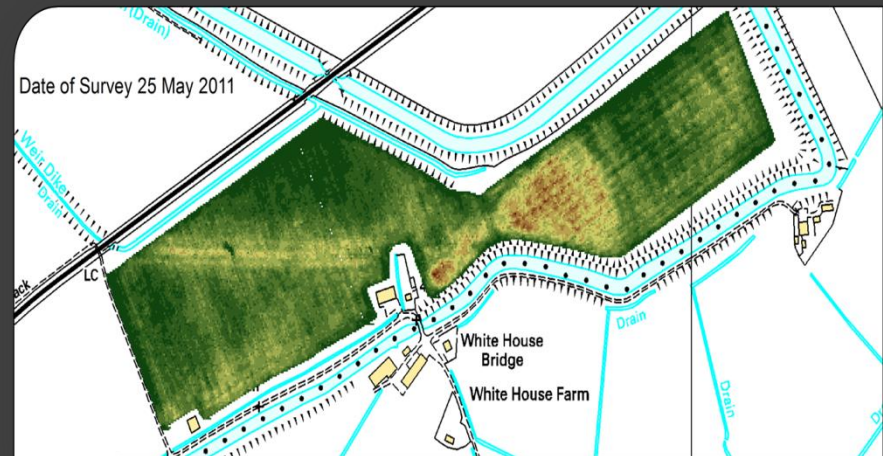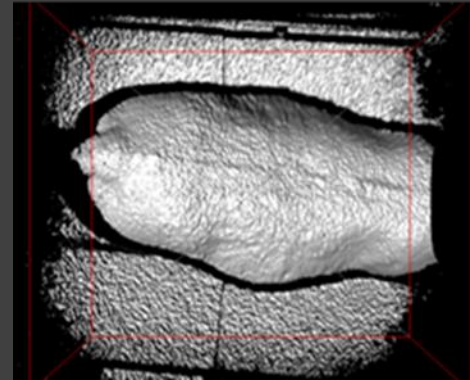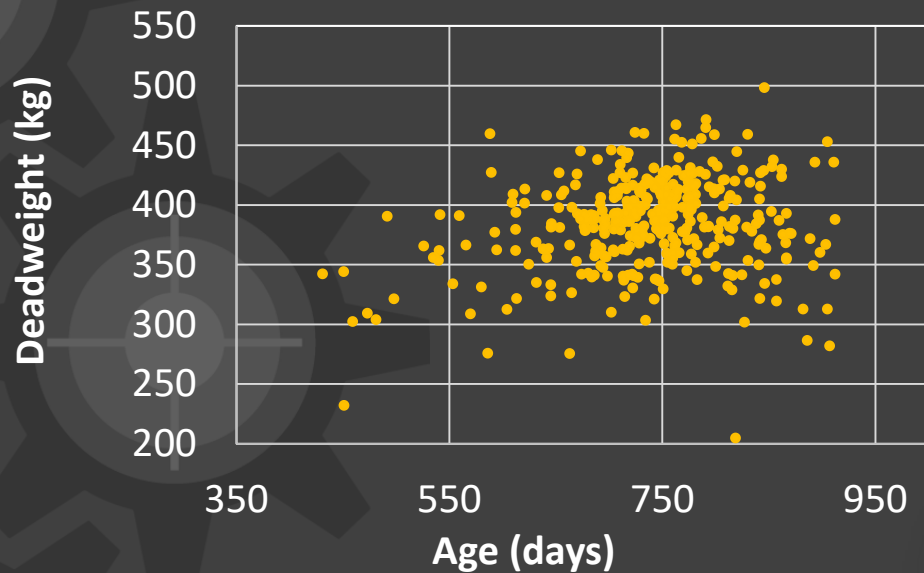
Examples developed in Scotland

Technology from other sectors

- Thermal imaging – defence (night vision)
- 3D imaging – computer games
- Ultrasound imaging – medical physics
- Accelerometers – aircraft and bridges (vibration)
- Laser methane detector – health & safety
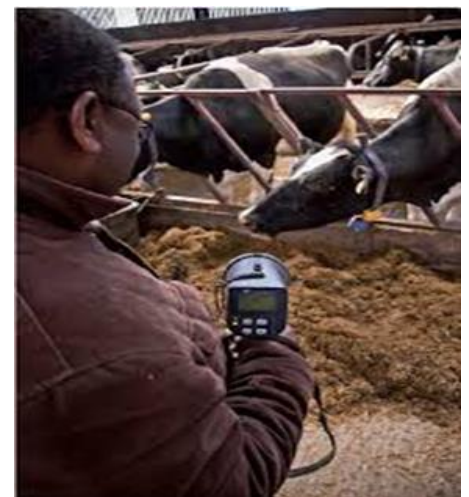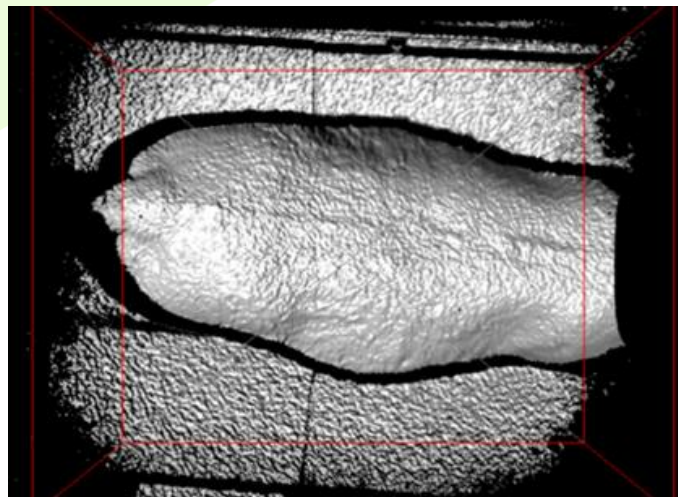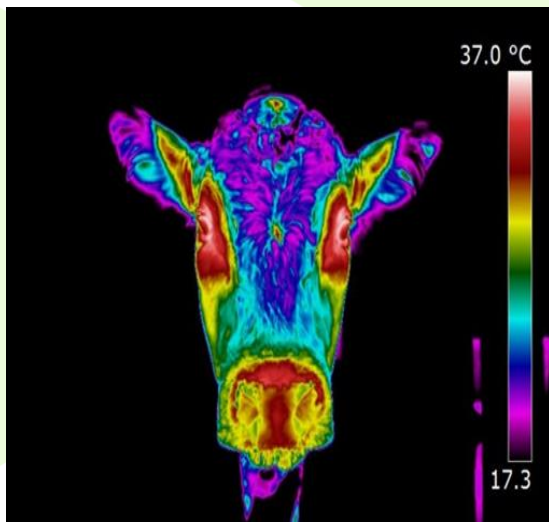
New uses for 'old' sensors

- Accelerometers originally applied to monitor oestrus activity

- Developed algorithms to look at intake and rumination behaviour

- May be possible to identify other behaviours?

Combinations of technology

- Innovate UK-funded 'Cow Health Monitor' project
- Based on Fullwood Merlin^2 robot
- Cow contentment high
- Sensor combinations for health

Techniques – body temperature
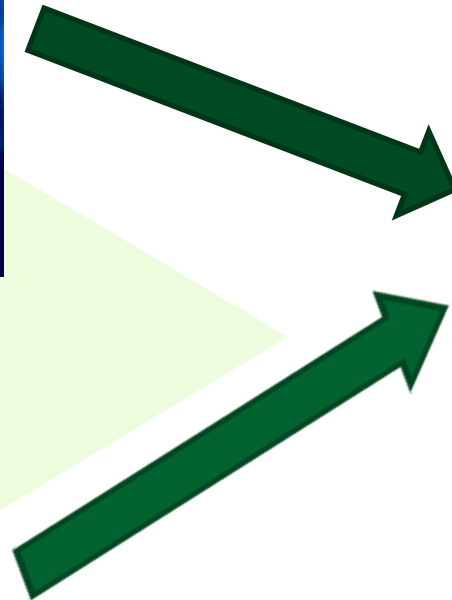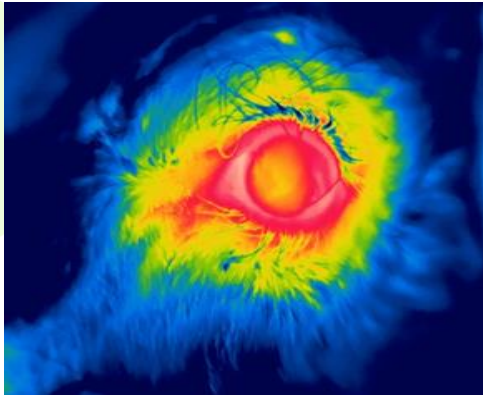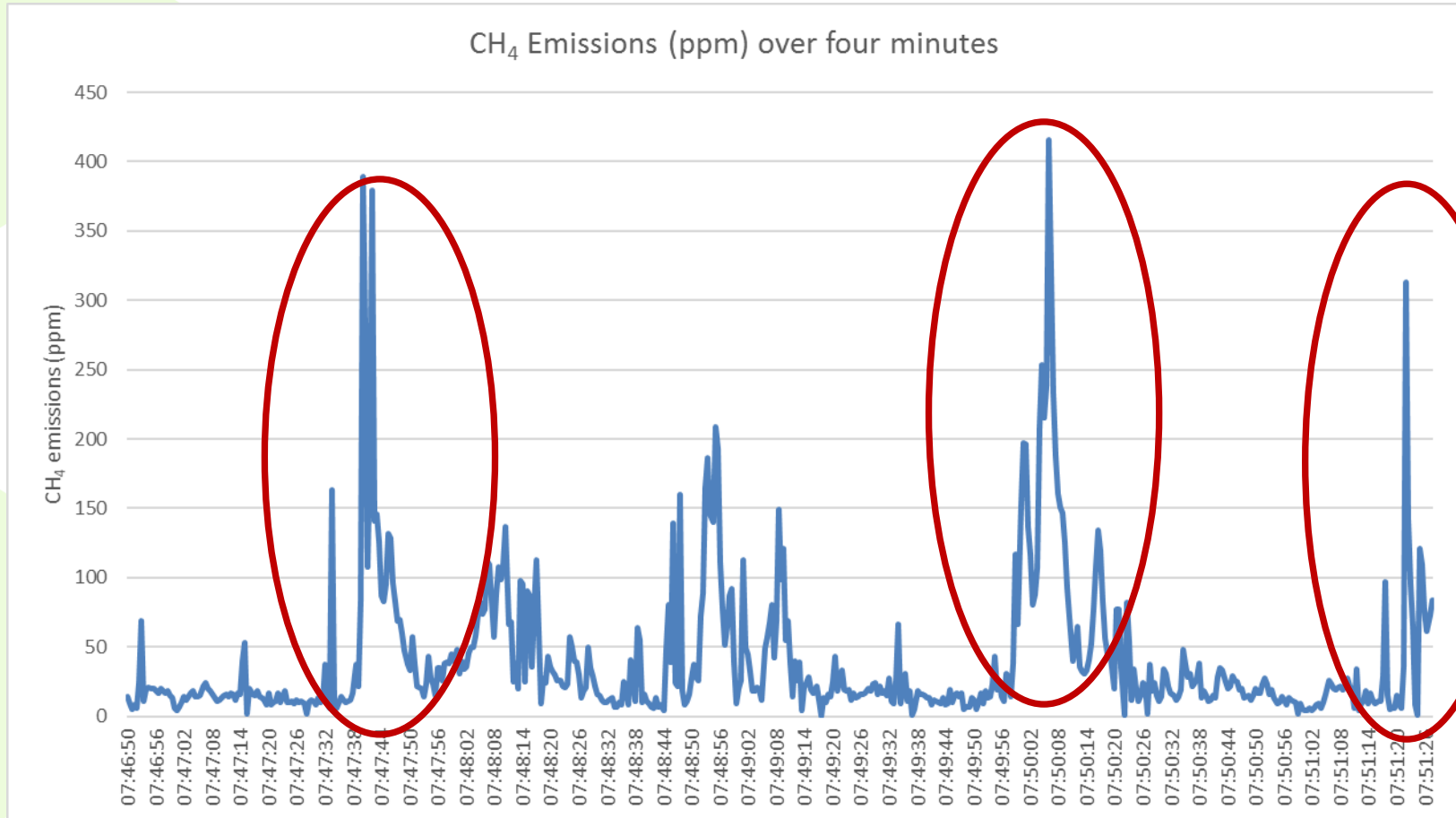
Techniques – health prediction

Laser Methane Detector (LMD)

- CH_4 emissions estimated using LMD
- Two readings per second
- Animal in each treatment groups monitored for approximately 4 mins
- Previous studies have shown comparability with chambers
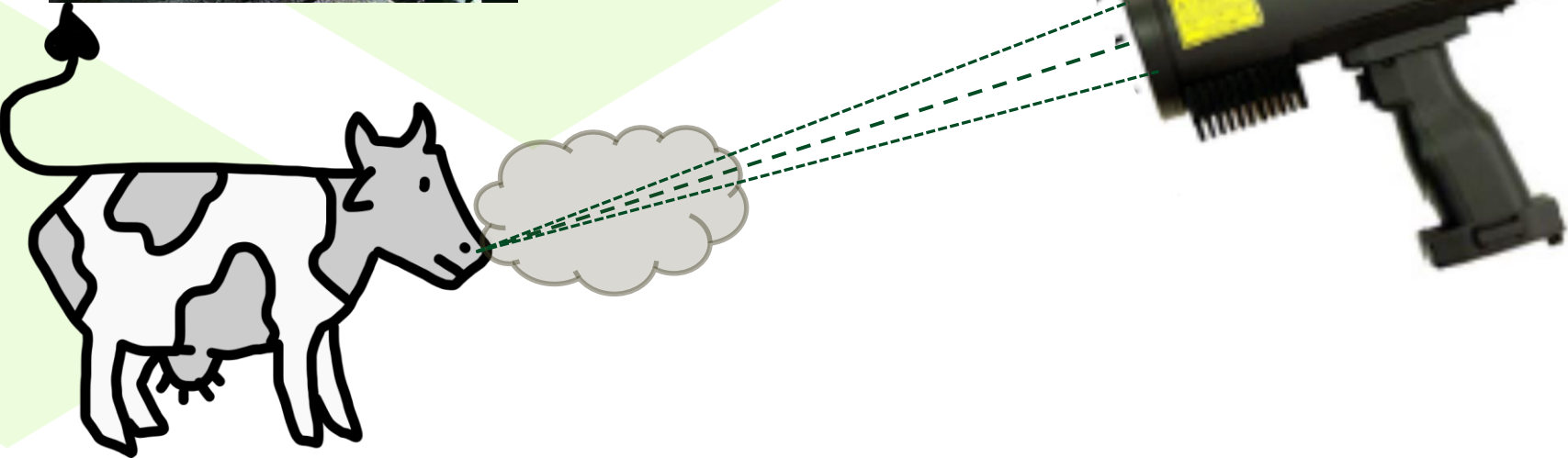
Continuous monitoring: 4 mins

CH$_4$ Emissions (ppm) over four minutes

Questions?