

New technologies coming to practice in sheep farming – some examples from SRUC research

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EID – Electronic Identification

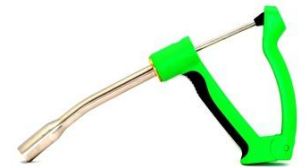


- UK: EID compulsory in sheep since 2010
- Precision Livestock Farming

- RFID
- Various forms



Sheep EID bolus
(with black tag)



EID ear-tags +
applicators

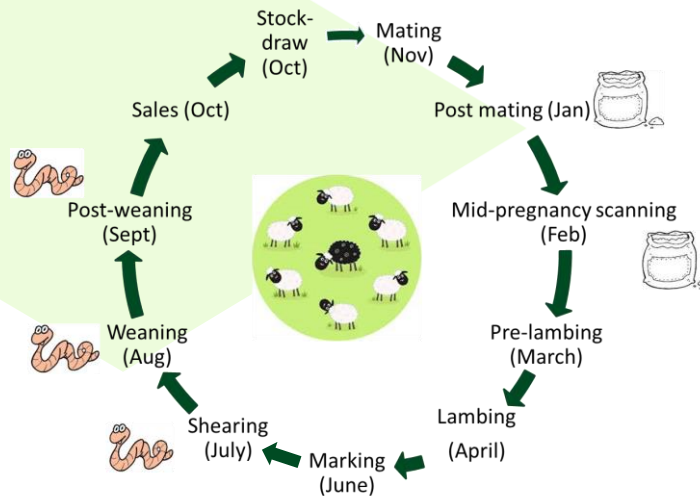


How we use it on SRUC farms?



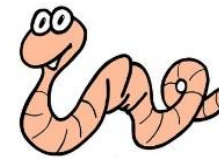
- Recording movement of animals
- Medicine records
- Finishing lambs
- Group management

- Topping
- Scanning
- Feeding
- Worming



- Applied research

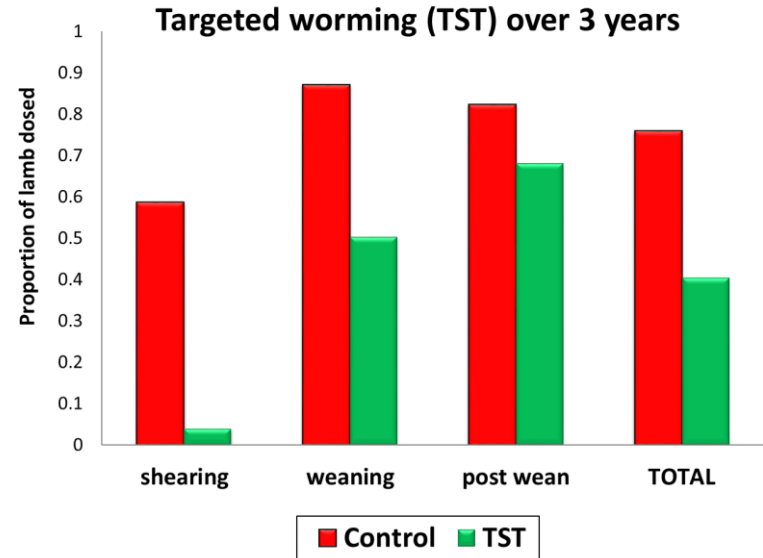
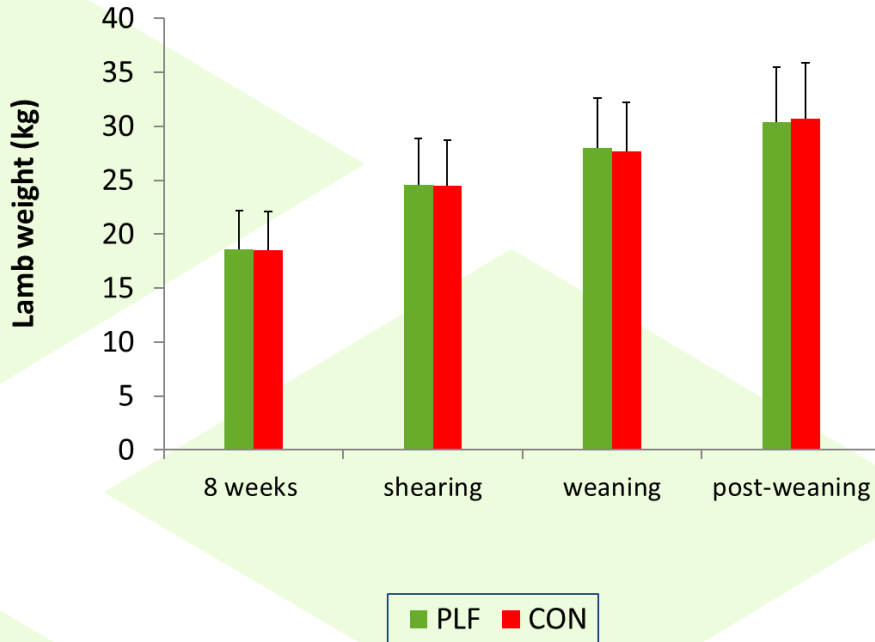
Targeted Worming



- Collaboration with Moredun Research Institute
- Only worm lamb that do not thrive:
 - ⇒ better for animal
 - ⇒ dilute resistance to anthelmintics
- Compare target weight (algorithm) with actual weight (PLF)
 - ≥ target weight: no dose
 - < target weight: dose
- Control - wormed on pooled FEC (to heaviest weight)



Targeted Selective treatment (TST) – results over 3 years



- Similar growth rates of lambs
- Lower use of anthelmintic

Wormer use:
Con: 29.6 l
TST: 16.5 l

- Smart Sheep project
 - incorporation of TST algorithm to weigh head for commercial use



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Walk Over Weigh (WOW)



WOW design and operation

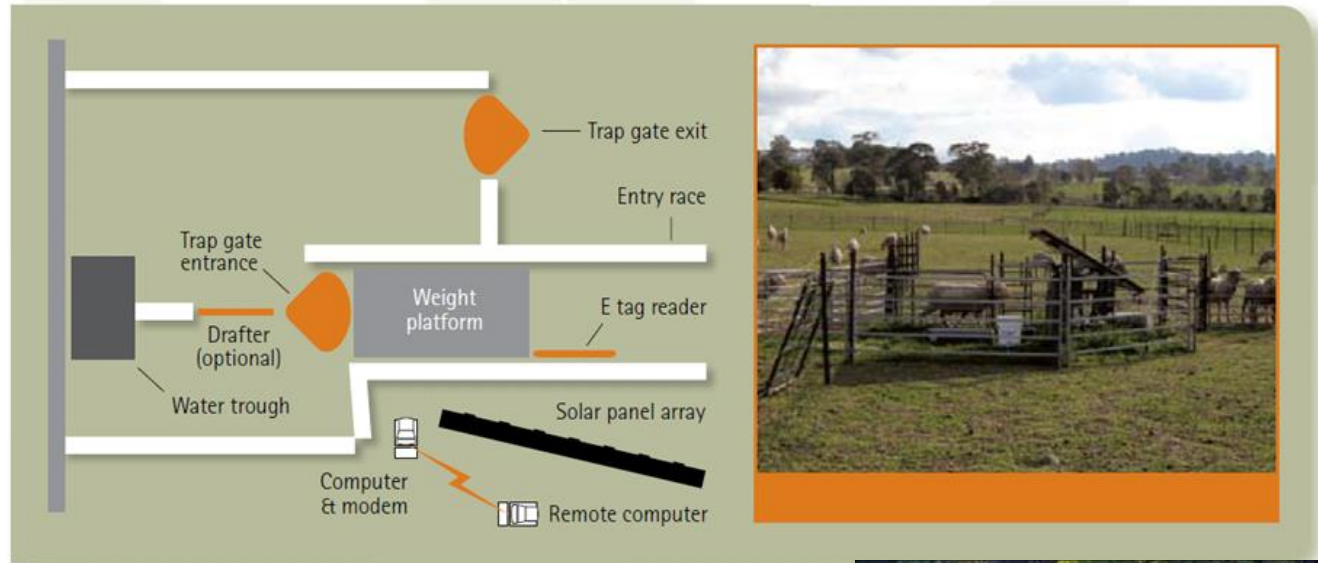
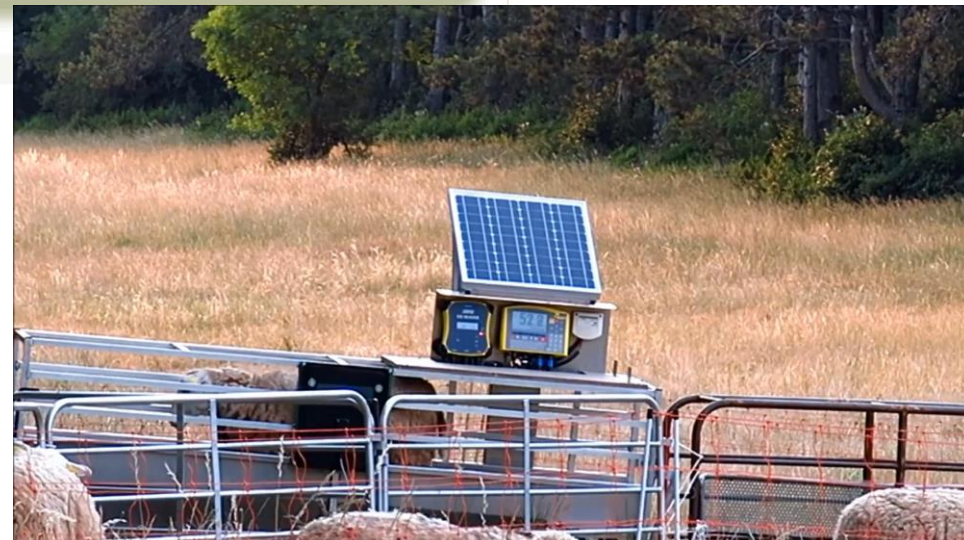


Figure 1. WOW system



The Internet of Things

<https://www.nesta.org.uk/blog/precision-agriculture-almost-20-increase-income-possible-smart-farming>

FUTURE FARMS small and smart

Rural / upland areas

- Phone signal?
- Internet connections?
- Line of sight?
- Battery life?

SURVEY DRONES

Aerial drones survey the fields, mapping weeds, yield and soil variation. This enables precise application of inputs, mapping spread of pernicious weed blackgrass could increase yields

FLEET OF AGRIBOTS

A herd of specialised agribots tend to crops, weeding, fertilising and harvesting. Robots capable of microdot application of fertiliser reduce fertiliser cost by 99.9%.

FARMING DATA

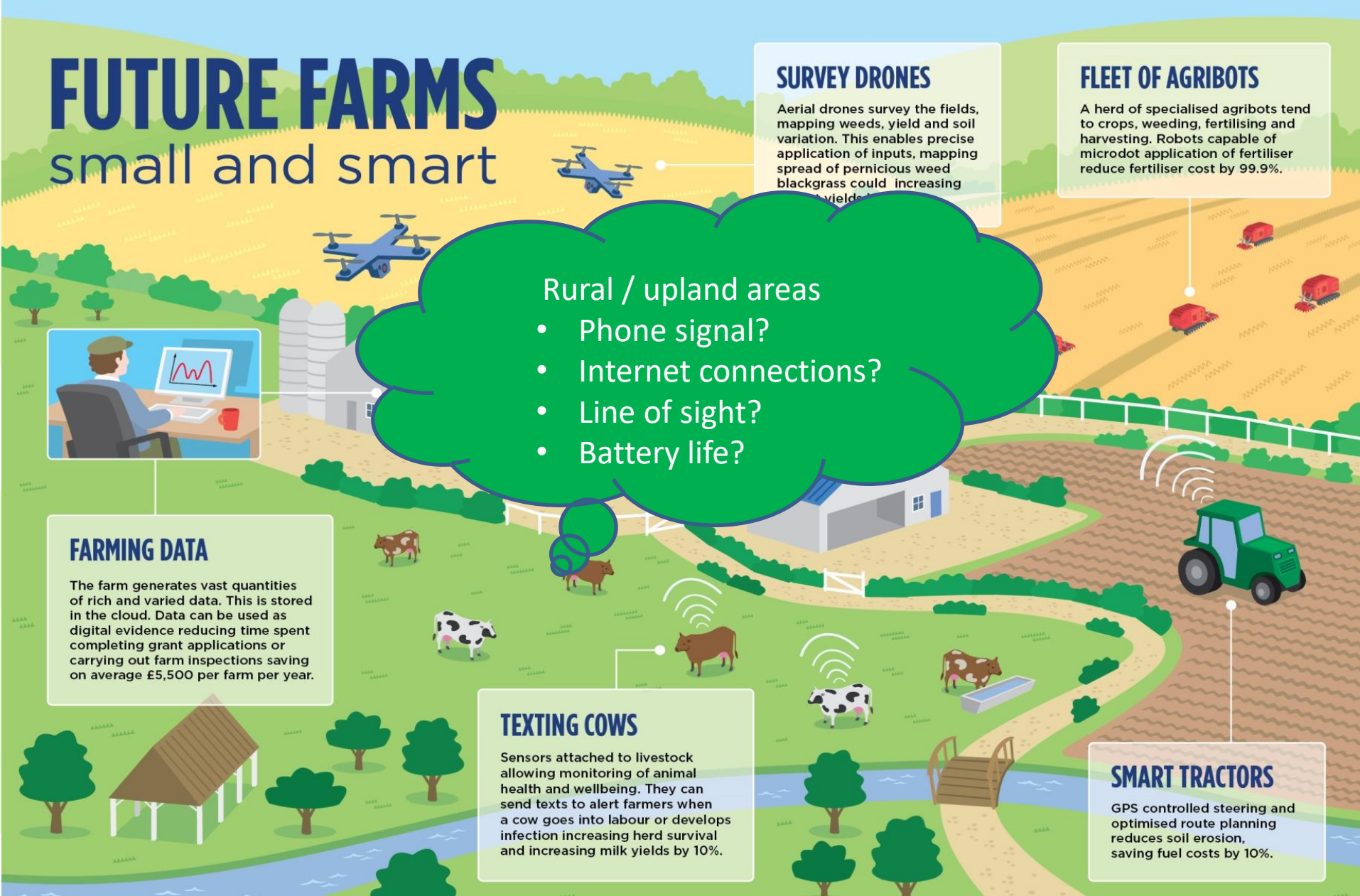
The farm generates vast quantities of rich and varied data. This is stored in the cloud. Data can be used as digital evidence reducing time spent completing grant applications or carrying out farm inspections saving on average £5,500 per farm per year.

TEXTING COWS

Sensors attached to livestock allowing monitoring of animal health and wellbeing. They can send texts to alert farmers when a cow goes into labour or develops infection increasing herd survival and increasing milk yields by 10%.

SMART TRACTORS

GPS controlled steering and optimised route planning reduces soil erosion, saving fuel costs by 10%.

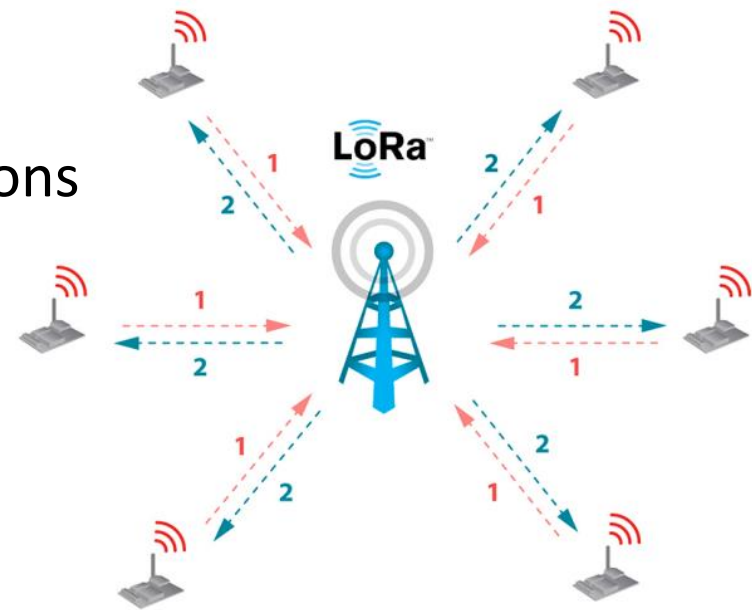


Internet of Things



LoRaWAN

- long range/low power communications platform – wide area network
- Low cost (gateway <£1000)
- >10 miles range in rural areas
- ideal for deployment of sensors and devices where small amounts of data transmitted periodically
- Scottish Government commitment to roll out



Precision Agriculture and the Internet of Things (IoT)

The logo for CENSIS, featuring a blue circle with a white cross and the text "CENSIS" and "censis.org.uk" below it.

Minimising costs / maximising production efficiency

- Promoting sustainability
- Livestock welfare
- Economic viability of farms
- Environmental compliance

VEHICLE AND EQUIPMENT

- Tractors
- High Precision
- GPS

LIVESTOCK MANAGEMENT

- Health and welfare monitoring
- Feeding management

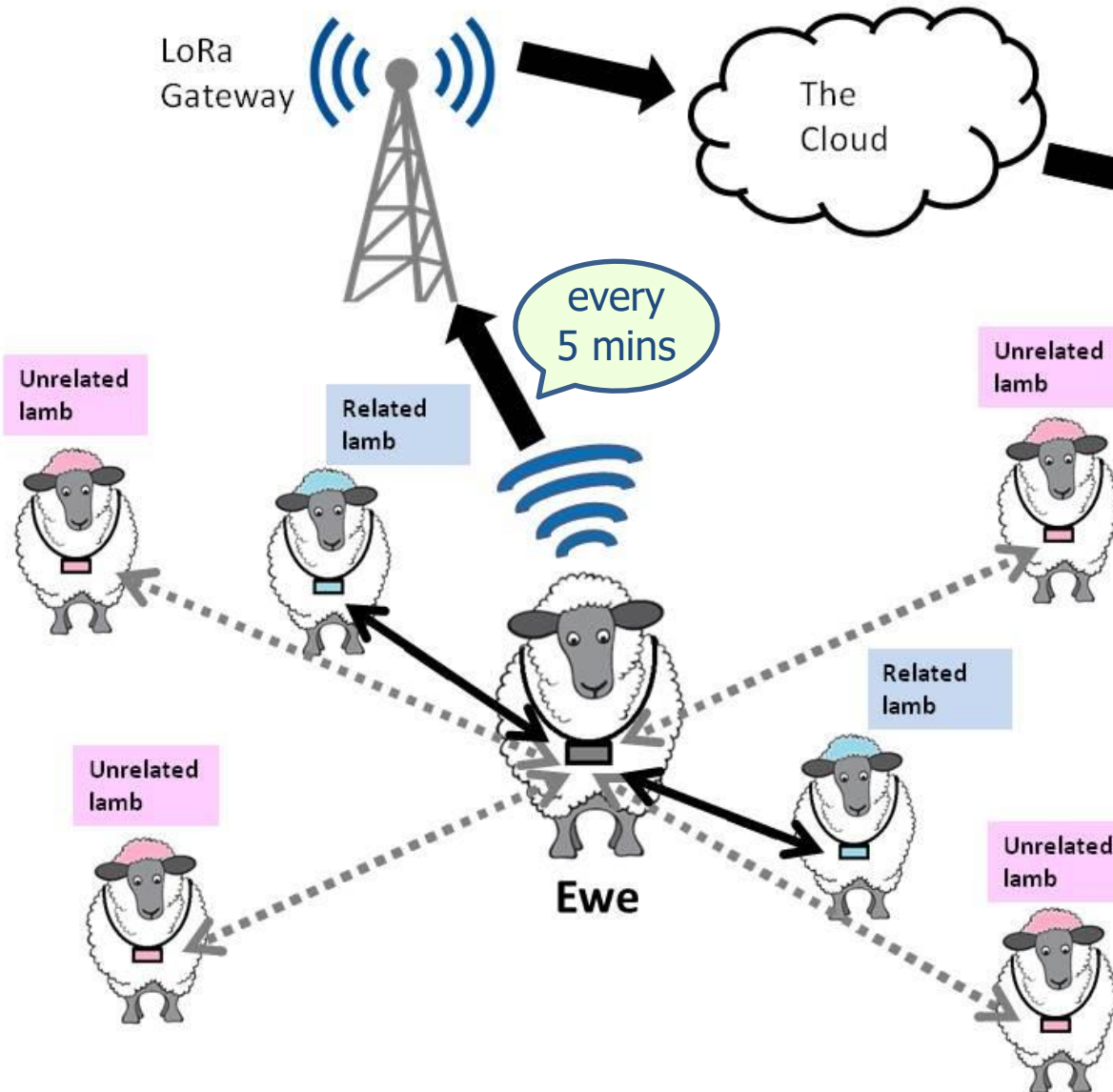
FIELD MONITORING

- Soil moisture and temperature
- Crop health
- Fertiliser and pesticide application

DATA MANAGEMENT

- Data storage and analysis
- Decision support and management

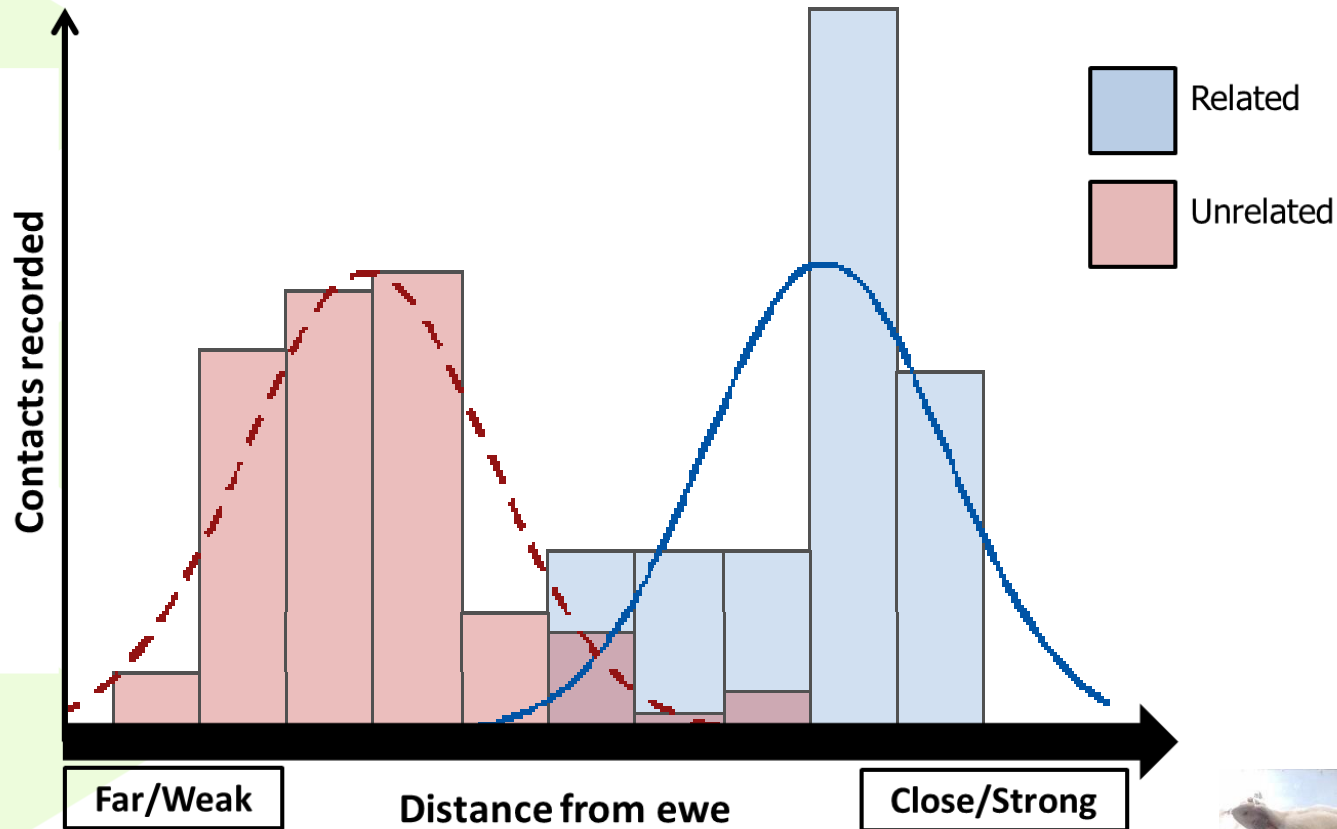
Ewe-lamb proximity & LoRaWAN



- Small beacons on lambs
- Larger LoRaWAN receiver on ewes
- Interactions recorded
- Providing info on likely relationships
- GPS in ewe collars – lambing behaviour / location sites

Distance between readings – RSSI

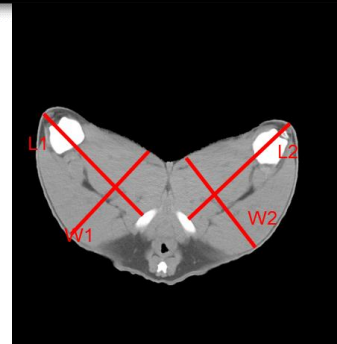
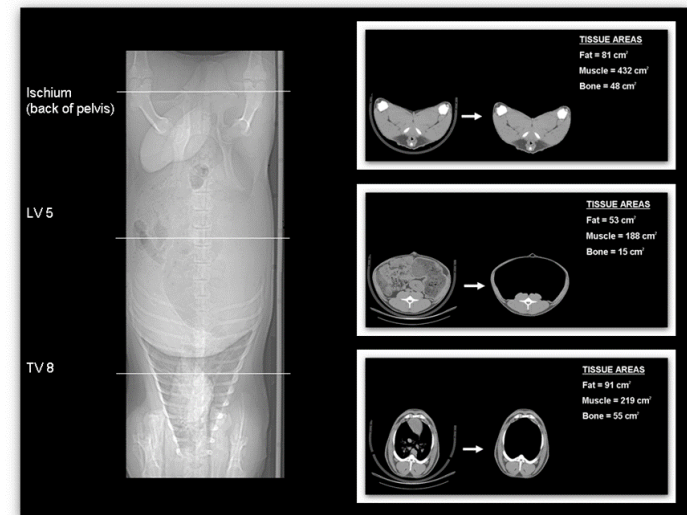
RSSI – Received signal strength indication



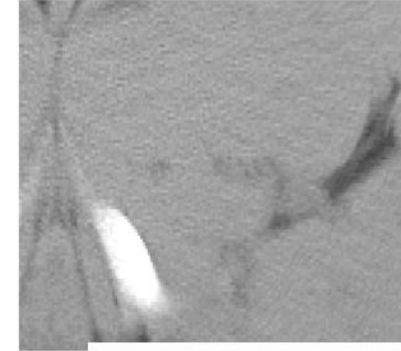
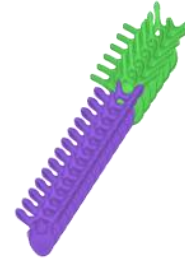
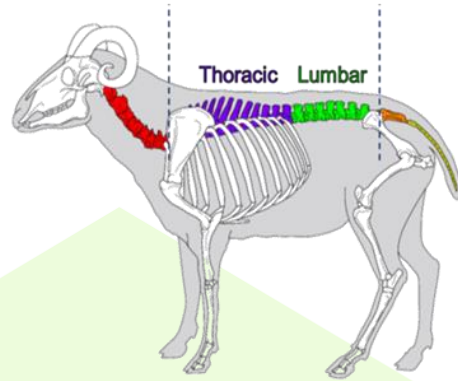
CT scanning



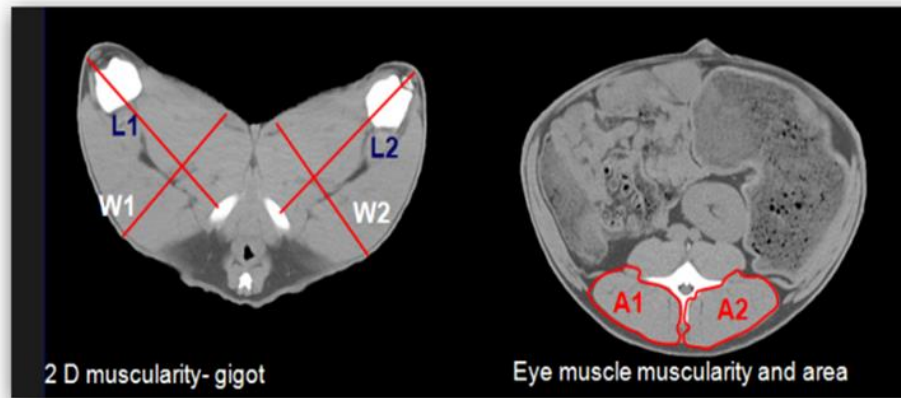
- CT scanning - detailed carcass measurements without slaughter
- CT lean, CT fat, CT muscularity – since late 90s (>12K lambs)



Research-proven new CT EBVs



**Meat quality
(IMF)**



2 D muscularity- gigot

Eye muscle muscularity and area

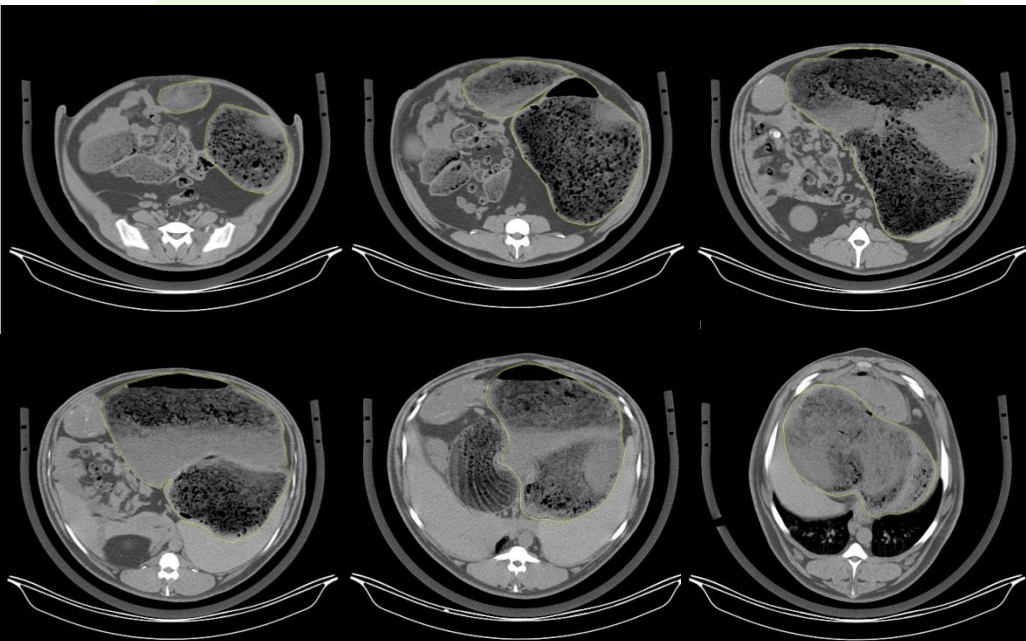
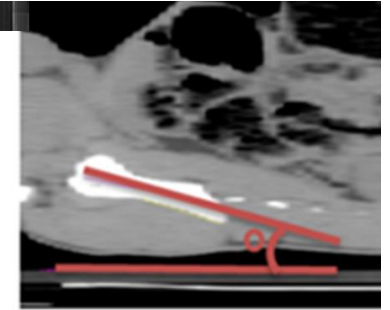
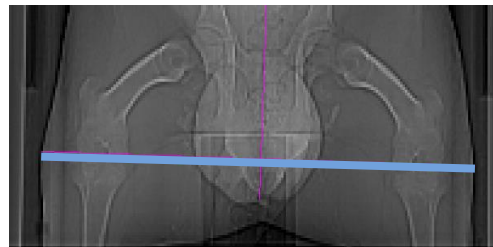
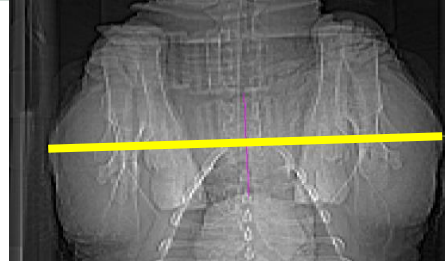
Spine traits

Loin muscularity

Developing novel CT traits

Lambing ease predictors (in sires?):

- Shoulder width
- Hip width
- Pelvic dimensions / angle
- breed differences
- heritable within-breed
- genetic links to lambing ease



Methane predictors:

- Reticulo-rumen volume
 - breed differences
 - heritable within-breed



Scottish Government
Riaghaltas na h-Alba
gov.scot

Feed intake recording



Portable Accumulation chambers (PAC)



SRUC

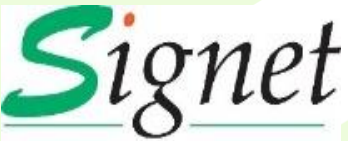


The value of technology



- Collection of accurate data:
 - at farm level / field level / individual animal level
 - informs management decisions (targeted interventions)
 - informs breeding decisions (genetic selection)
- Can reduce labour requirements, reduce costs, slow drug resistance, improve efficiency, improve health and welfare, increase rates of genetic improvement
- Quickly evolving to be more user-friendly and affordable
- Attracting a new generation of beef & sheep farmers?

Acknowledgements



Thank you for your attention!

Innovate UK



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