

Zimbabwe Herdbook Beef School 2019

# The European (British!) Experience: Adopting New Technologies for precision livestock (beef) farming

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**BEEF & LAMB**

Funded by farmers  
and the industry

Strategy  
and Market  
Intelligence

Technical  
(R&D and  
Knowledge  
Exchange)

Communications  
and Market  
Development



‘Inspiring our farmers, growers and industry to  
succeed in a rapidly changing world’

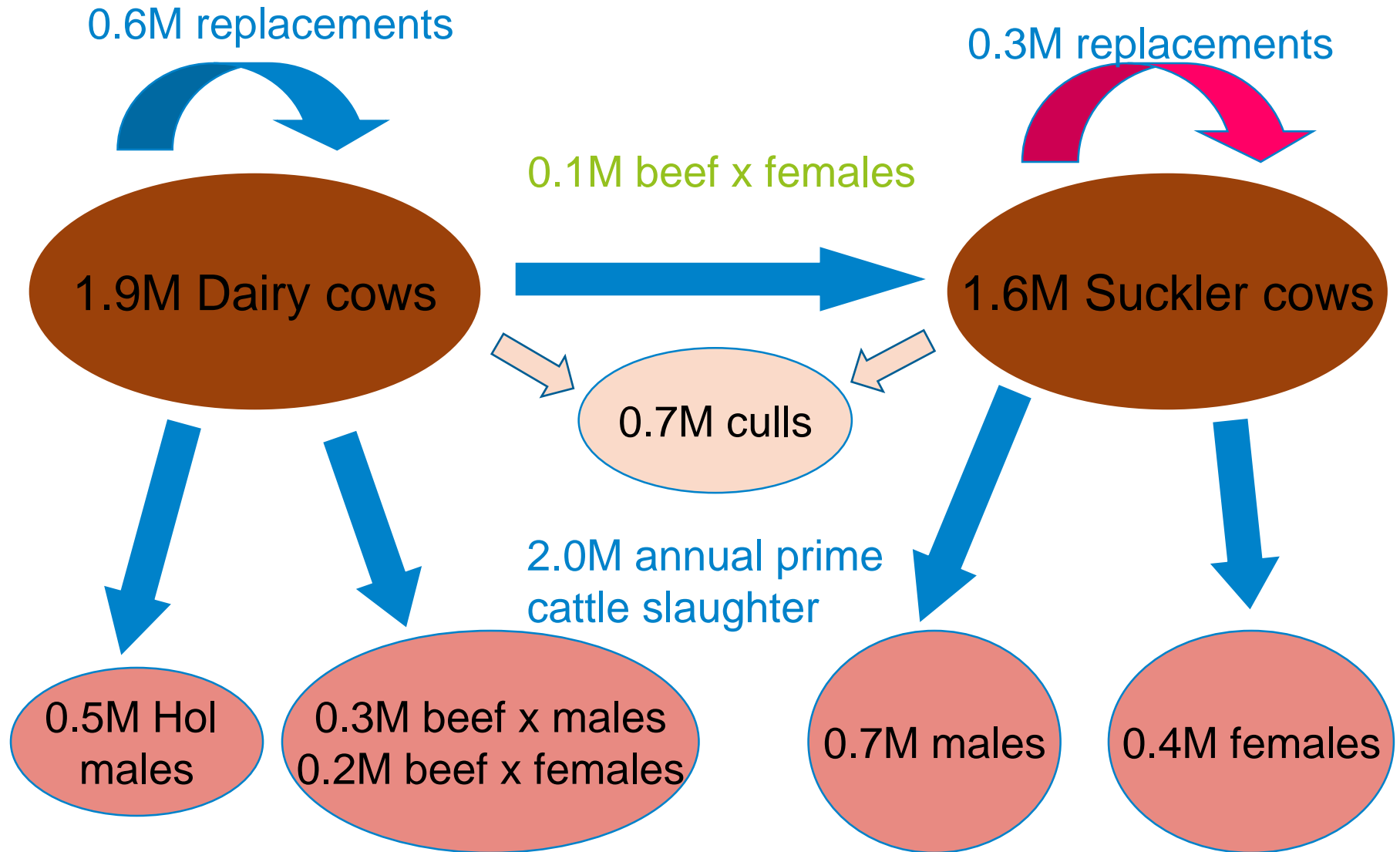
# Beef (and sheep) levy rates

	Slaughter/ export levy £/head	Producer levy £/head
Cattle	£1.35	£4.05
Calves (not exceeding 68 kg deadweight or under 6 months of age if exported)	£0.08 (8p)	£0.08 (8p)
Sheep	£0.20 (20p)	£0.60 (60p)

# AHDB role in a minute



# UK Cattle numbers



22% Pastures

17% Semi-natural grasslands

18% Crops cover

12% Woodlands



# Bull and Steer Systems



# Overview

- Why precision?
- What is precision?
- Examples of Precision Livestock Farming in Europe
- Opportunities and challenges



# Why precision?

- To deliver improved sustainability
  - Environmental
    - Reduced environmental impact
    - Adapt to climate change and disease risk
  - Financial
    - Reduced cost or added value
  - Social
    - Save time
    - More healthy/nutritious food

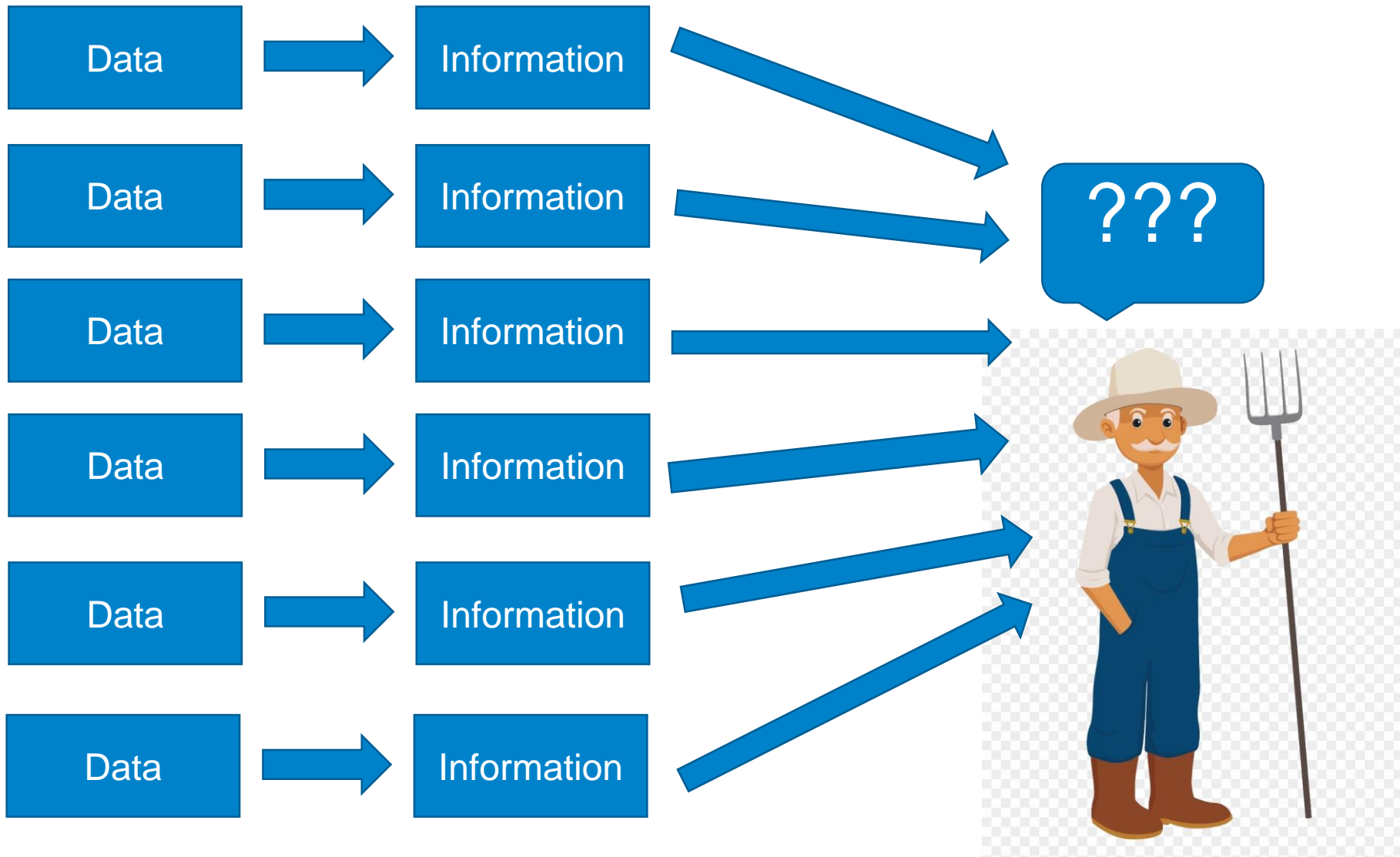
# What is precision?



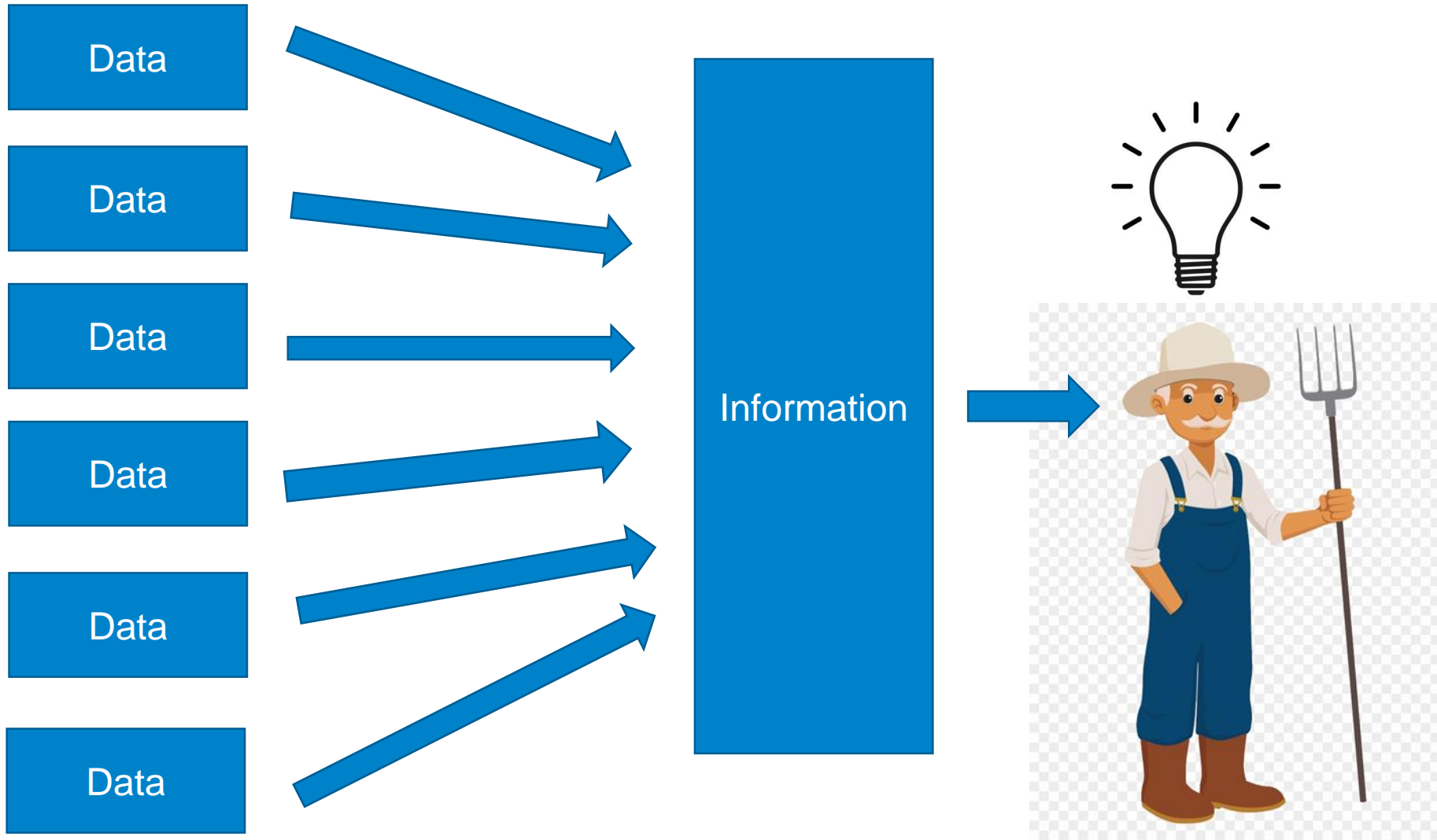
# So what is the agri-technologists toolkit?

- Sensors
- Location and tracking
- Robotics
- Data analytics
- Block chain
  - track and trace system
  - reward system eg eco-credits

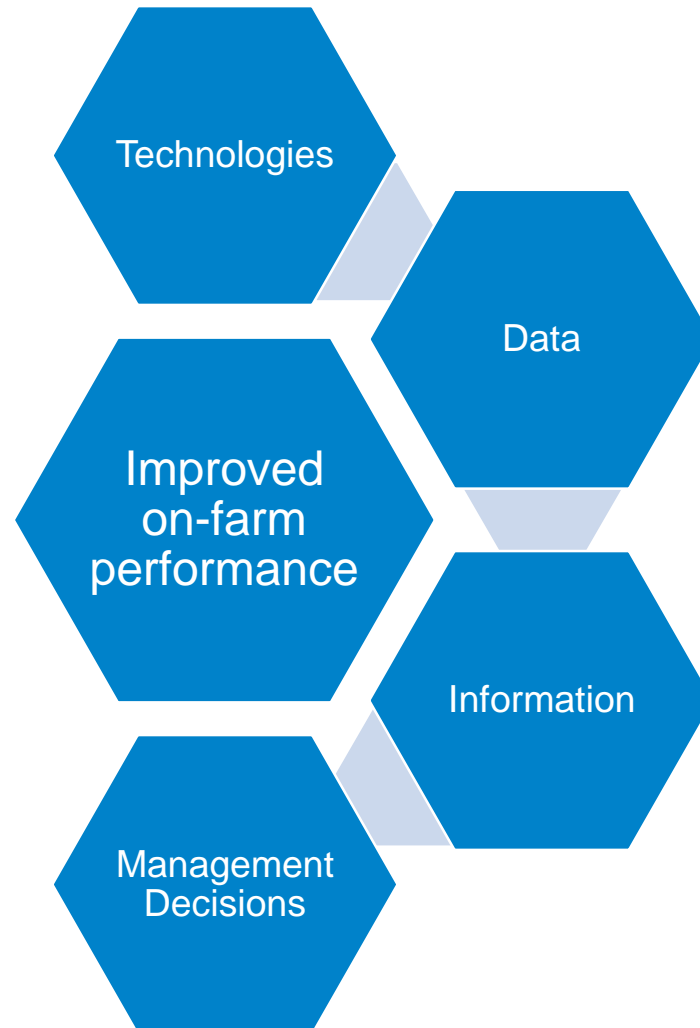
# Use of data by farmers



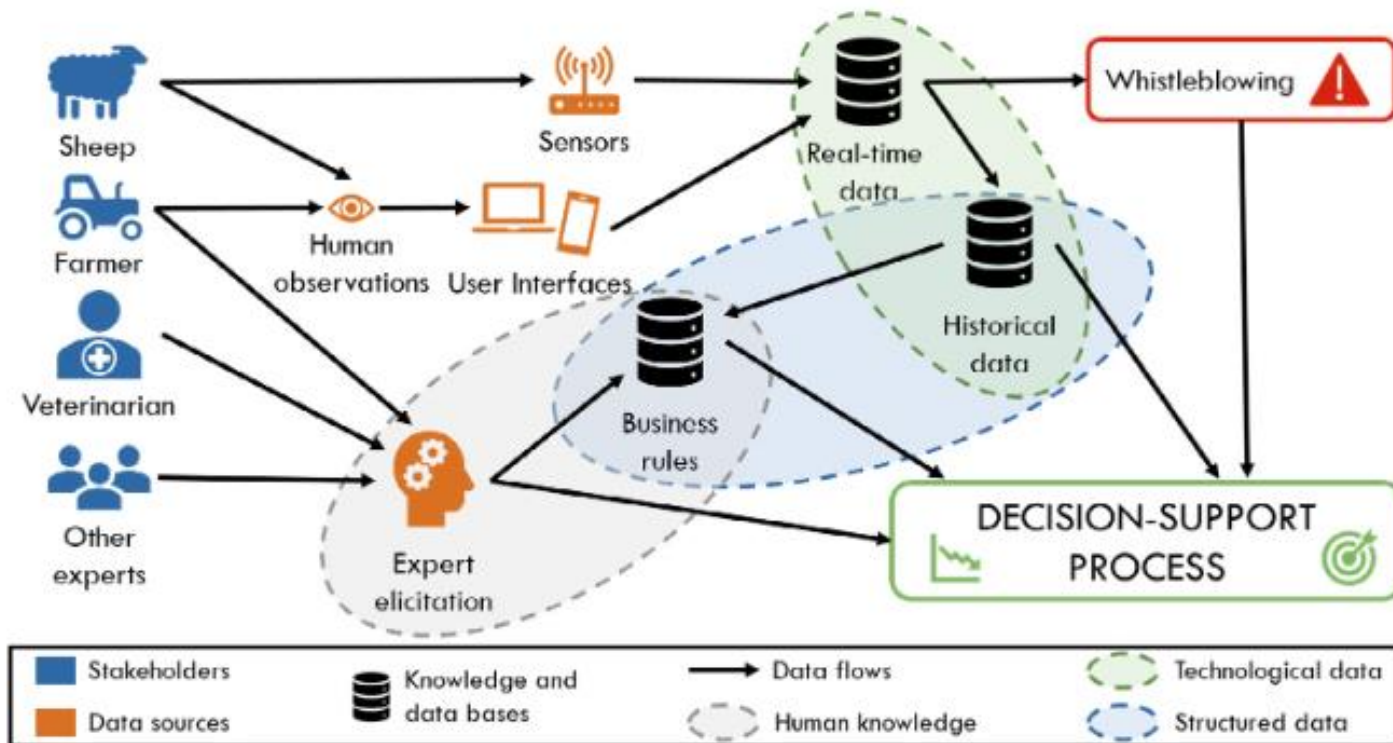
# Use of data by farmers



# Precision



# Data flows for a decision support system in sheep production



# Precision Livestock Farming

- Grassland
- Feeding
- Animal monitoring
- Plant & animal genetics



# Better utilisation of grassland



# A good example of industry – science partnership



## GrassCheck GB

*Helping grassland farmers make better use of pasture*

Service provided by:



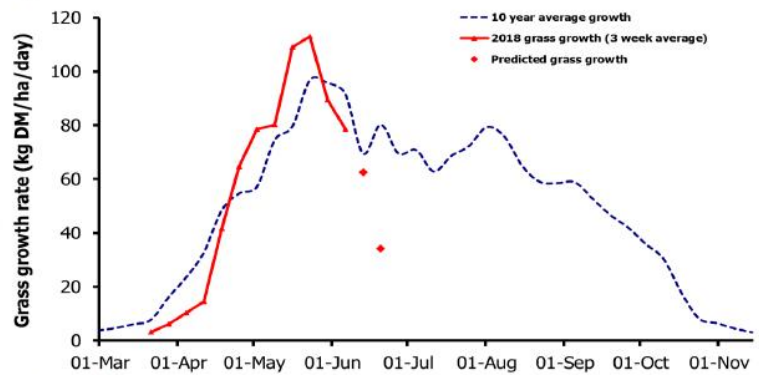
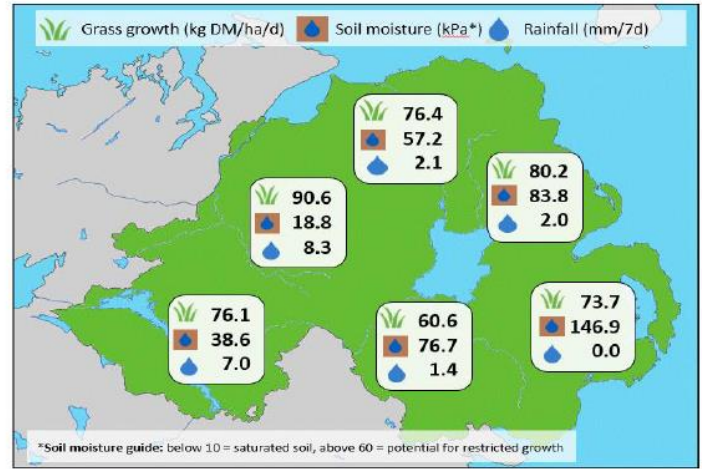
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### Week Beginning 11 June 2018



#### MANAGEMENT NOTES:

- Growth has fallen in the past week in line with predictions and due to the dry conditions experienced particularly in the eastern counties of N.I.
- Predictions this week show a dramatic fall in grass growth based on weather forecasts and current dry soil conditions at AFBI Hillsborough. These extremes haven't been witnessed since June 2008 and it is likely that these predictions will be localised to areas which continue to receive little rainfall.
- However, a large range in growth rates is currently evident across GrassCheck farms (24 – 137kg DM/ha/day). Wetter farms or those which have received localised heavy rainfall recently are expected to maintain current growth rates.
- Grass quality remains low across much of the province due to the stress on the plant from dry weather. Testing grass and reviewing current supplementation rates for target performance.

Weekly Grass Growth (kg DM/ha/day)		
GrassCheck plots	78.2	
Dairy farms*	88.5	
Beef & sheep farms*	71.5	
Forecast	7 day	62.5
	14 day	34.2

	Grass Quality	
	Plots	On-farm
DM (%)	21.8	19.6
ME (MJ/kg DM)	11.1	10.5
CP (% DM)	16.0	18.0
WSC (% DM)	15.7	10.6

\*On-farm grass growth data supplied by AgriNet  
 #GrassCheck plots receive 270 kgN/ha/year



# GrassCheck<sup>GB</sup>



# Farm locations in England, Wales & Scotland



# Precision for soils & grassland

- Real-time soil nitrate sensors
- Measuring grass cover
  - Satellite imagery/Yield maps
  - Spectral imaging
  - Ultrasound



# The next step for grassland monitoring?



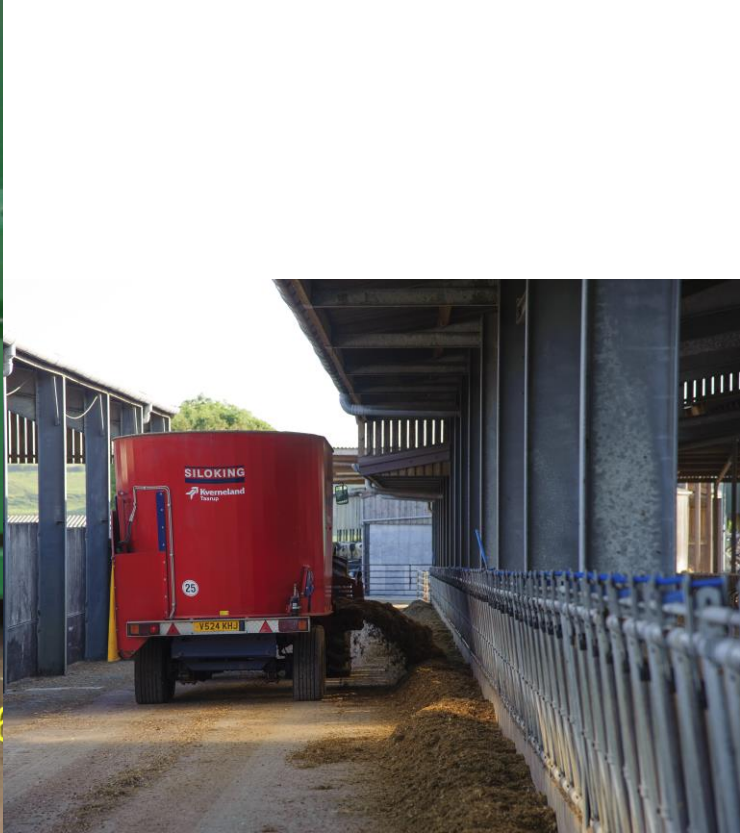
## Using the data – Precision grazing

- 56-250% more DM production, and lower wastage (thus higher utilisation)





# Feeding





10

11

12

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14

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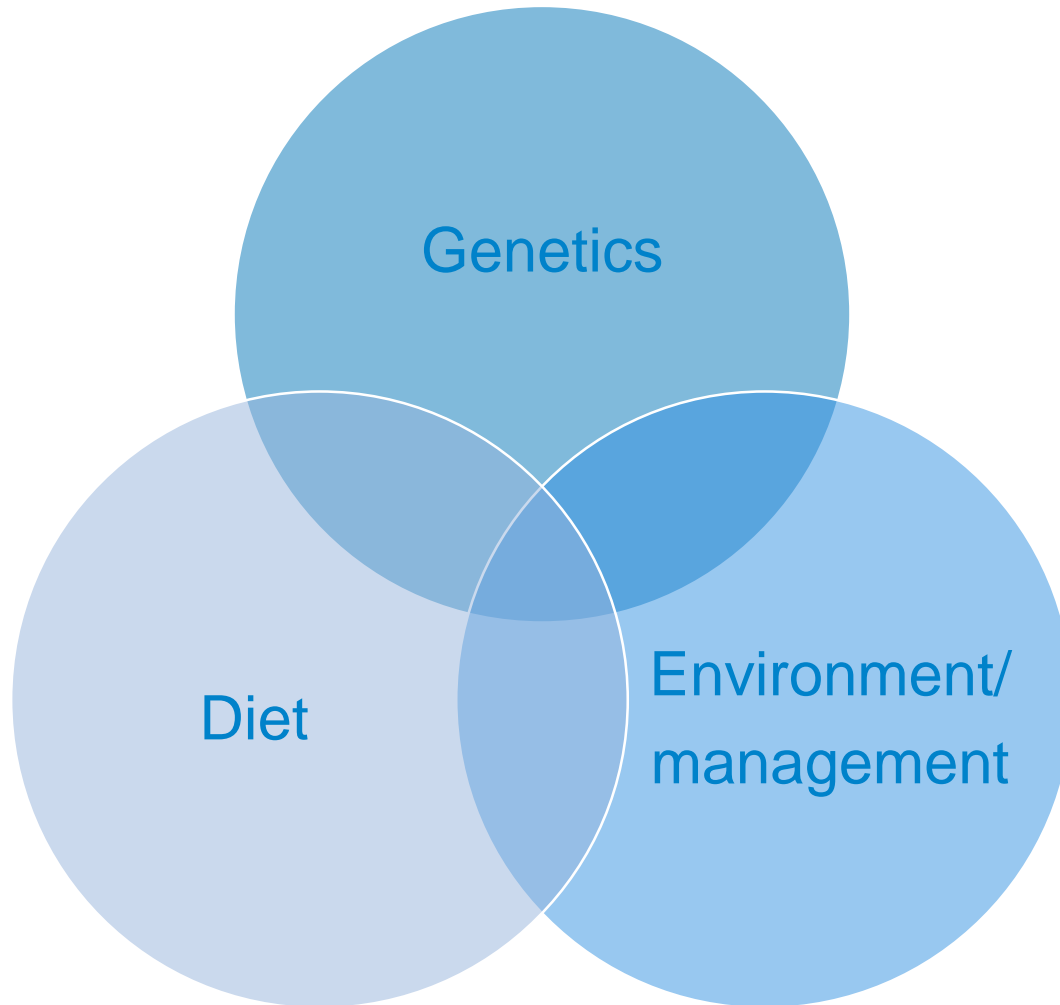
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# Components of feed efficiency



# What is needed to deliver genetic improvement programme

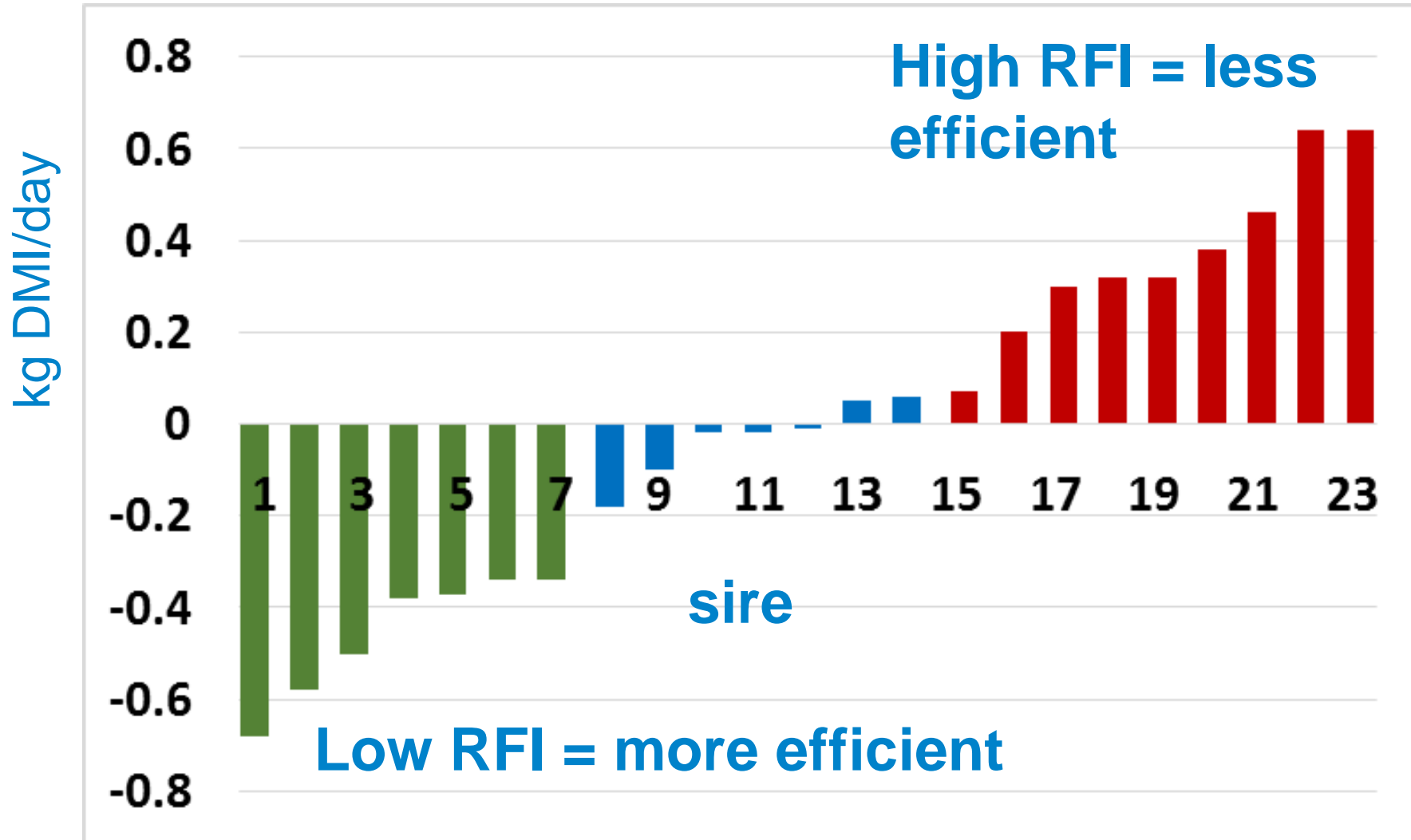
- phenotypes - quality and quantity
- pedigree records
- access to a genetic evaluation engine
- an organisational structure that seeks to equitably distribute the costs and benefits of a national genetic evaluation.

The logo for the Beef Feed Efficiency Programme features a blue silhouette of a cow standing on a green arrow that points to the right. The text 'BEEF FEED EFFICIENCY PROGRAMME' is written in white, bold, uppercase letters across the green arrow.

# BEEF FEED EFFICIENCY PROGRAMME

- 4 year project
- Funded by Defra and AHDB £1.75M
- Led by AHDB & SRUC
- Scottish unit funded by Scottish Government and ABP

# Residual feed intake by sire – B1&2

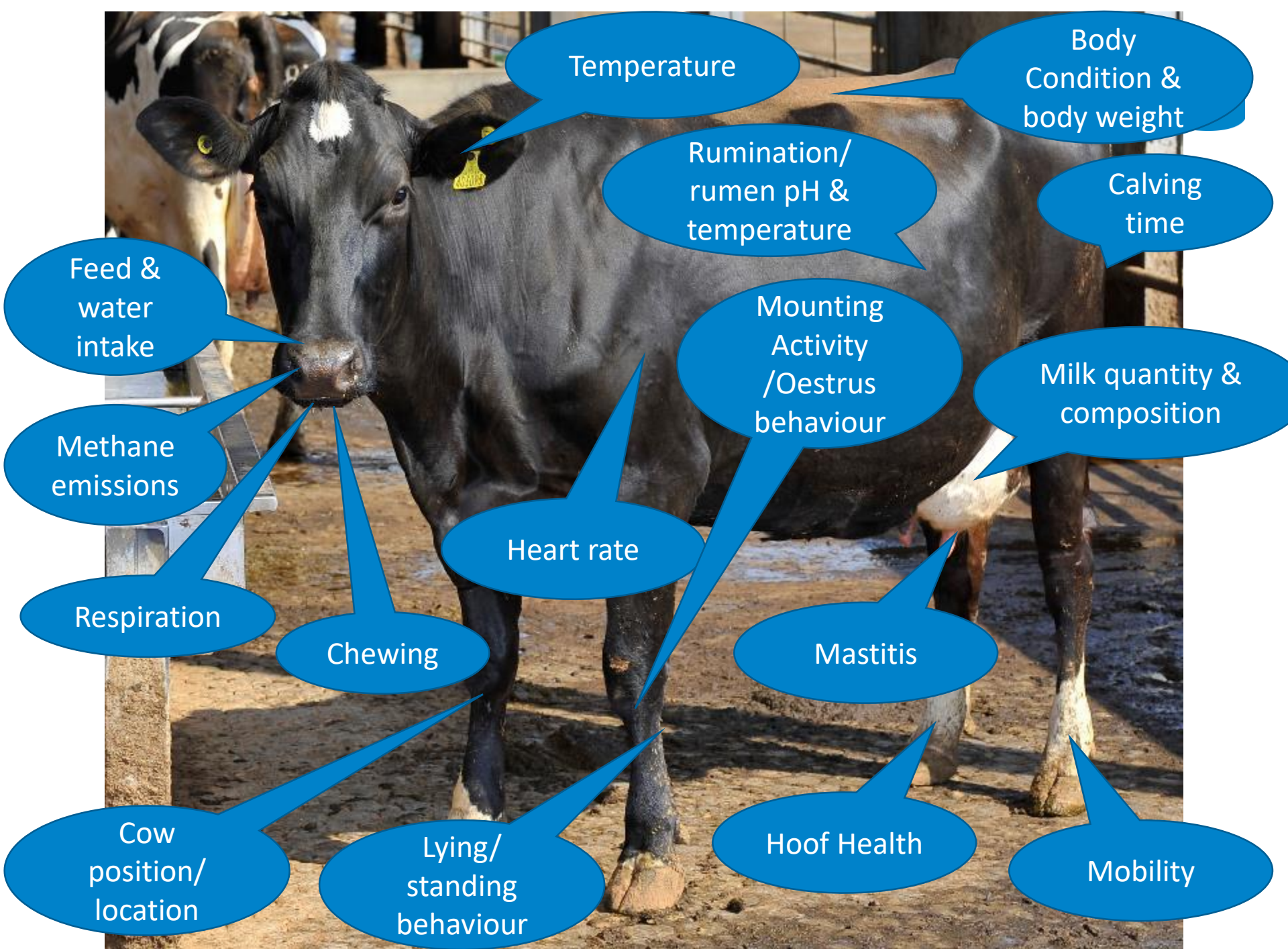




# Animal monitoring

# Don't forget the basics





Temperature

Body Condition & body weight

Ruminating/  
rumen pH & temperature

Calving time

Feed & water intake

Methane emissions

Mounting Activity /Oestrus behaviour

Milk quantity & composition

Respiration

Heart rate

Mastitis

Chewing

Cow position/  
location

Lying/  
standing  
behaviour

Hoof Health

Mobility

# Animal monitoring



Robotic milking



Rumen pH bolus

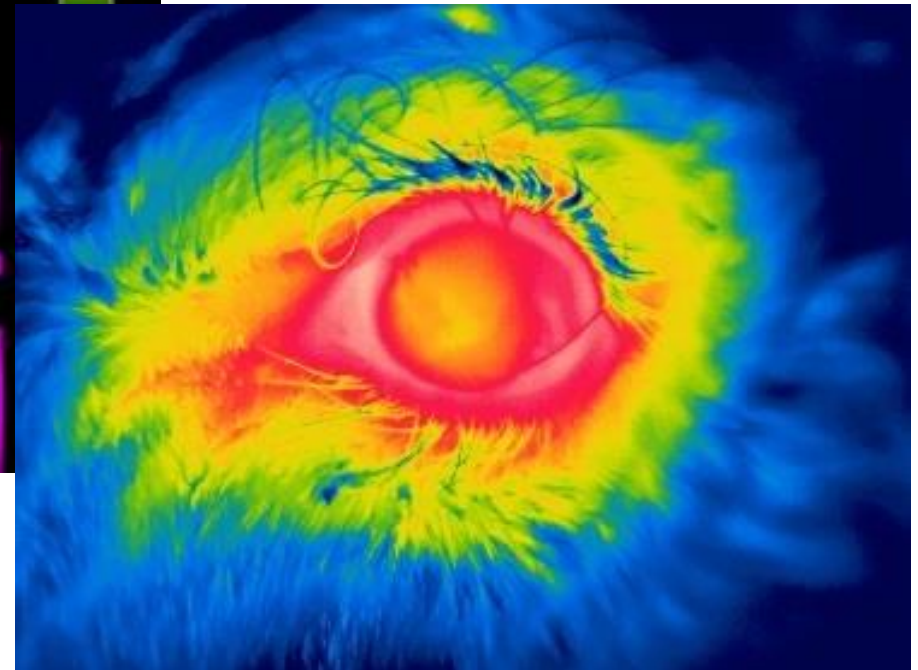
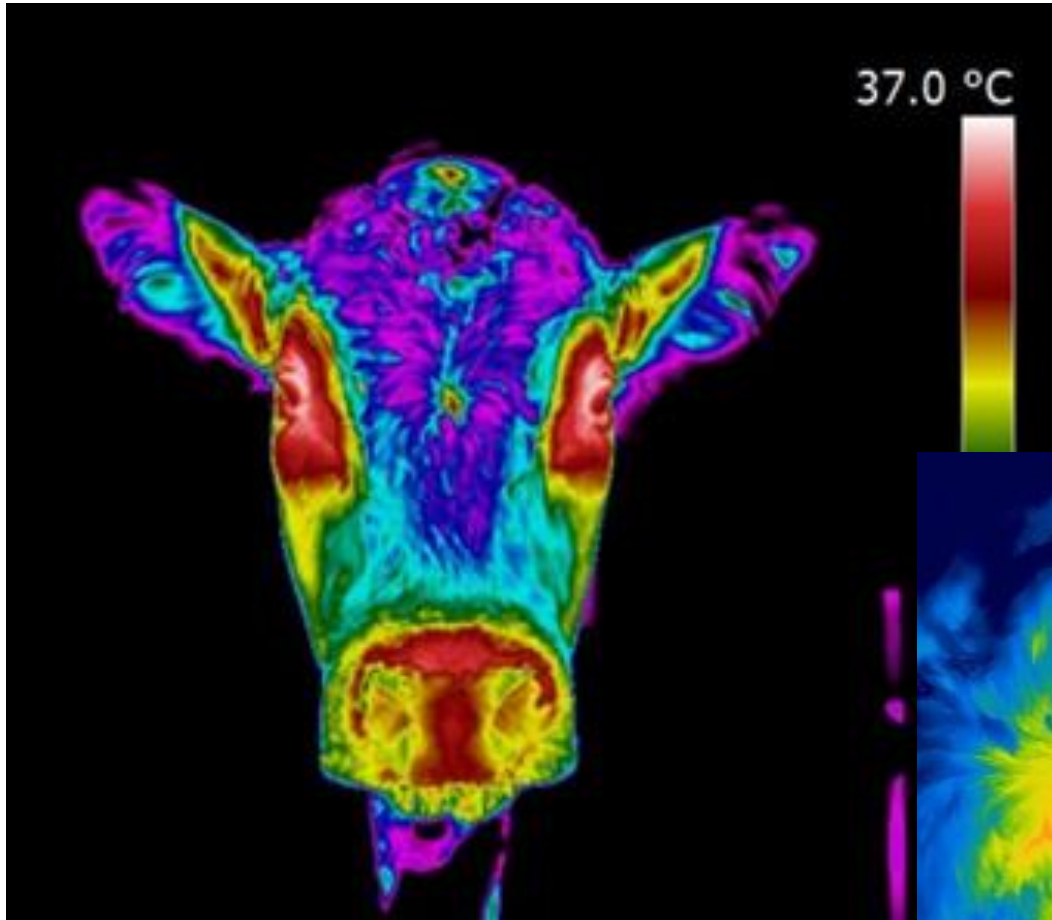


Leg mounted accelerometer



Health and fertility management

# Thermal images



# Cattle Breeder Magazine, Spring 2019

## 24-hour monitoring improves beef herd management



start to impede the herd's performance."

The SenseHub system has proven to be accurate to the point that it even raised attention to an outbreak of New Forest Eye which was causing a number of cows some mild discomfort. "We kept getting health alerts for a specific cow but, because she wasn't showing any physical symptoms to suggest there was anything wrong with her, we dismissed them," Dan describes. "However, each time another cow contracted the condition the SenseHub system recognised the animal's distress as a change in her activity and rumination patterns and flagged her up. We therefore investigated further and diagnosed the problem as New Forest Eye which we were able to treat before it got too serious. We then used the SenseHub activity and rumination graphs to assess each cow's response to the medication which gave us the peace of mind that the treatment was working."

The monitoring system also enables Lorraine and Dan to keep a tight control on the herd's breeding programme.

"Having recently converted the herd to a spring calving pattern we were eager to maintain a tight calving window," Dan continues. "That meant finding a way of spotting each and every heat as accurately as possible so that we could make informed decisions about how to manage each cow's breeding cycle."

"The SenseHub system highlights the subtlest of heats and has meant we no longer need to worry about spotting bulling cows while they are away from

The monitoring system also enables Lorraine and Dan to keep a tight control on the herd's breeding programme.

*A prototype solar-powered signal booster, located on a hill above the farm, collects data from the grazing cows and transmits it to the SenseHub server from where the data can be viewed via a smartphone or computer.*

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- Health and fertility monitoring system
- 120 Hereford sucklers
- Ear tag monitors activity, rumination, behaviour
- Heat detection and early warning for health

## New project to boost dairy-beef production



A new project has been launched to boost production efficiency within the UK's dairy-beef sector. WELL-CALF will develop precision technologies for optimising the production efficiency through improvements in health and management throughout an animal's life.

## New OPTIBEEF project aims for improved beef production



A new research and development project involving the beef industry, scientists and precision engineering companies aims to enhance returns for beef producers while helping processors become more efficient.



# Opportunities and challenges



data

## Example of benefits (Tullo *et al*)

Improved environmental impact:

- Reduced ammonia emissions through ventilation control
- Early warning to facilitate rapid intervention for health and welfare issues – lameness, mastitis
- Precision feeding to optimise performance and resource use, reducing waste – at a pen or individual level
- Fertility management – timing insemination and monitor calving

# Opportunities to improve adoption

- Attractive to new entrants to livestock production
- Need to be adapted to farmers needs and skills (Hostiou *et al.*, 2017)

# Precision in crops



- Do not move!
- Benign atmosphere

# Challenges for animals

- Non-static
- Corrosive atmosphere
- Exposed and remote locations
- Lack of infrastructure
- Individuals/groups
- Frequent sampling – biosecurity, high value equipment theft

# Barriers and solutions

- End-user uptake
- Complexity
- Lack of management infrastructure
- Skills
- Need for co-design
- Multi-sensor integration
- Internet and energy supply
- Knowledge Exchange

# Final thoughts – where do we go from here?

- Enhanced communication – IoT (Internet of Things), 5G
- Real-time, multi-sensor data processing and integration – usable results
- User-led development of decision support dashboards
- Cyber-security





# References (further reading!)

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Thank you



A vibrant landscape of a green field at sunset. The sun is low on the horizon, casting a warm glow over the scene. The sky is filled with colorful clouds, and the field is lush and green. A path leads from the foreground towards the horizon. The overall mood is peaceful and inspiring.

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