

Surveys and sequencing: a pilot study in British cattle



Gillian Maxwell¹, Madeleine K. Henry¹, Catriona Webster¹, Roger Humphry¹, Judith Evans¹, Shannon Proctor¹, Jude I. Eze¹, Julie Stirling¹, Ian Hutchinson¹, Jo Baughan¹, Maria Costa¹, Geoff Foster^{2*}, Sue C. Tongue^{1*} *Correspondence: sue.tongue@sruc.ac.uk or geoff.foster@sruc.ac.uk or geoff.foster@sruc.ac.uk or geoff.foster@sruc.ac.uk or geoff.foster@sruc.ac.uk or mailto:geoff or Geoff Foster, Sue C. Tongue^{1*} *Correspondence: geoff.foster@sruc.ac.uk or mailto:geoff or geoff or geoff or <a href="mailto:su



In the United Kingdom there are routine statutory surveys for the monitoring of healthy pigs and poultry for evidence of antimicrobial resistance (AMR). Faecal samples are collected at the point of entry to the food chain and processed according to EU protocols for harmonized monitoring of AMR. There are no similar surveys for cattle, or sheep.

With the industry and our partners, we have developed and are delivering a pilot survey of cattle

Healthy cattle were sampled from across Great Britain

Cattle were sampled at participating premises (abattoirs) across Great Britain.

A structured sampling strategy based on throughput was used.

Lessons were learnt about:

- Engagement needs time industry attitudes to participation
- Data availability for structuring sampling strategy
- Operational constraints to achieving sampling plan



Caecal samples were taken from the intestine



In 2023, over a six-month period 294 samples were collected. A further 66 samples are being collected in February-March 2024.



 \square Lessons were learnt about the essential role of:

- Preparation, Communication & Clarity
- Problem-solving by involvement of those 'at the sharp end'
- Enthusiasm and Collaboration

Five main types of bacteria are being studied

- 1. Generic *E. coli*
- 2. Campylobacter
- 3. Enterococci
- 4. Extended-Spectrum β-Lactamase *E*.coli
- 5. Carbapenemase producing *E. coli*



This pilot will provide:

- Estimates of the frequency of recovery of each of the bacterial species in faeces from healthy cattle.
- An indication of any differences between laboratory methods.
- Baseline estimates of evidence for AMR in the sampled population for the specific bug-drug combinations.

Samples are processed in the lab





Biochemical and other tests are carried out to identify bacteria





Resistance testing of minimum inhibitory concentrations

$\bigcirc \bigcirc \bigcirc$		$\circ \circ \circ$	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$
			\bigcirc \bigcirc	\bigcirc \bigcirc	$\bigcirc \bigcirc$
$\bigcirc \bigcirc \bigcirc$		\circ \circ \circ	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$
			$\bigcirc \bigcirc$	\bigcirc \bigcirc	\bigcirc \bigcirc
\bigcirc \bigcirc \bigcirc			\bigcirc \bigcirc	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$
\bigcirc \bigcirc \bigcirc		\circ \circ \circ	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$
			\bigcirc \bigcirc	\bigcirc \bigcirc	$\bigcirc \bigcirc$
$\bigcirc \bigcirc \bigcirc \bigcirc$	\circ \circ \circ	$\circ \circ \circ$	$\bigcirc \bigcirc$	$\bigcirc \bigcirc$	$\circ \circ$

DNA extracted for sequencing

SRUC is a charity registered in Scotland, No. SC003712