

Sue C. Tongue¹, Julie Stirling¹, Judith Evans¹, Steven Murray², Catriona Webster¹, Roger W. Humphry¹, the CARS-NHS-FSS team³, George J. Gunn¹, Geoffrey Foster^{2,3}

¹Scotland's Rural College, West Mains Road, Edinburgh, EH9 3JG, Scotland, Email: sue.tongue@sruc.ac.uk

²SAC Consulting Veterinary Services, Inverness, Scotland

³CARS-NHS-FSS team, Health Protection Scotland, Glasgow, Ninewells Hospital, Dundee & Food Standards Scotland, Aberdeen Scotland



www.sruc.ac.uk



Introduction

Antimicrobial resistance (AMR) is a global challenge with national, regional and local implications.

Collection of antimicrobial sensitivity (AMS) data from all levels of the food chain is required to help inform the issue of antimicrobial resistance (AMR), its development and transmission.

The objectives were to estimate the prevalence of AMR in:

- enteric samples from sheep slaughtered at a Scottish abattoir
- faecal samples from Scottish slaughter lambs in field flocks

And to explore the utility of sheep movement data as a means to improve the design and interpretation of such monitoring & surveillance activities.

Methods

2017/18	Abattoir samples	Field flock samples
Phenotypic resistance	One <i>E. coli</i> isolate Disc diffusion Panel of 12 antimicrobials – 5 match field flock panel	One <i>E. coli</i> isolate Disc diffusion Panel of matching 5 antimicrobials – plus colistin (tested as MIC)
Genotypic resistance markers	One <i>E. coli</i> isolate PCR Panel of 7 AMR genes – all match field flock panel	Faecal extract tested using PCR Panel of matching 7 plus 4 additional AMR genes
Number	388 218 holdings	51 samples 11 flocks

Sheep movement data from a statutory database (ScotEID) was analysed to describe the abattoir throughput and the catchment area, plus their relationship to the Scottish slaughtered and slaughter sheep populations.

Conclusions: no sir, no sir, three bags empty

- The levels of AMR detected in these abattoir and field flock samples from Scottish sheep are extremely low.
- It will be difficult to measure changes in AMR in this sector without significant investment of resources.
- Analysis of sheep movement data can help to optimise surveillance activities.



References and Acknowledgements

SRUC is one of the SEFARI institutes. ERU's AMR work presented here was completed within RD 2.2.6 of the Scottish Government's Strategic Research Programme (SRP) 2016-2021. The sheep movements work was a linked study within RD 2.2.6 & EPIC. Food Standards Scotland were responsible for the collection of the abattoir samples as part of a wider CARS initiative. G. Foster is supported by Scottish Government through their Veterinary Services programme for livestock disease surveillance.

Further information on this work is available from: Dr Sue C. Tongue, Epidemiology Research Unit, SRUC Research, An Lòchran, Inverness Campus, Inverness, IV2 5NA. Tel: +44 (0)1463 246060 sue.tongue@sruc.ac.uk

Results

Abattoir isolates tested by disc diffusion:

The most common resistance found was to tetracycline (n=15, 3.9%).

Resistant isolates were also found to: ampicillin, amoxicillin with clavulanic acid, trimethoprim, sulphamethoxazole/ trimethoprim, gentamicin and chloramphenicol.

No isolates tested resistant to ciprofloxacin, ceftazadime, cefotaxime.

Field flock isolates tested by disc diffusion:

Two isolates were resistant to both ampicillin and amoxicillin with clavulanic acid.

No isolates tested resistant to ciprofloxacin, ceftazadime, cefotaxime.

No isolates tested resistant to colistin by MIC.

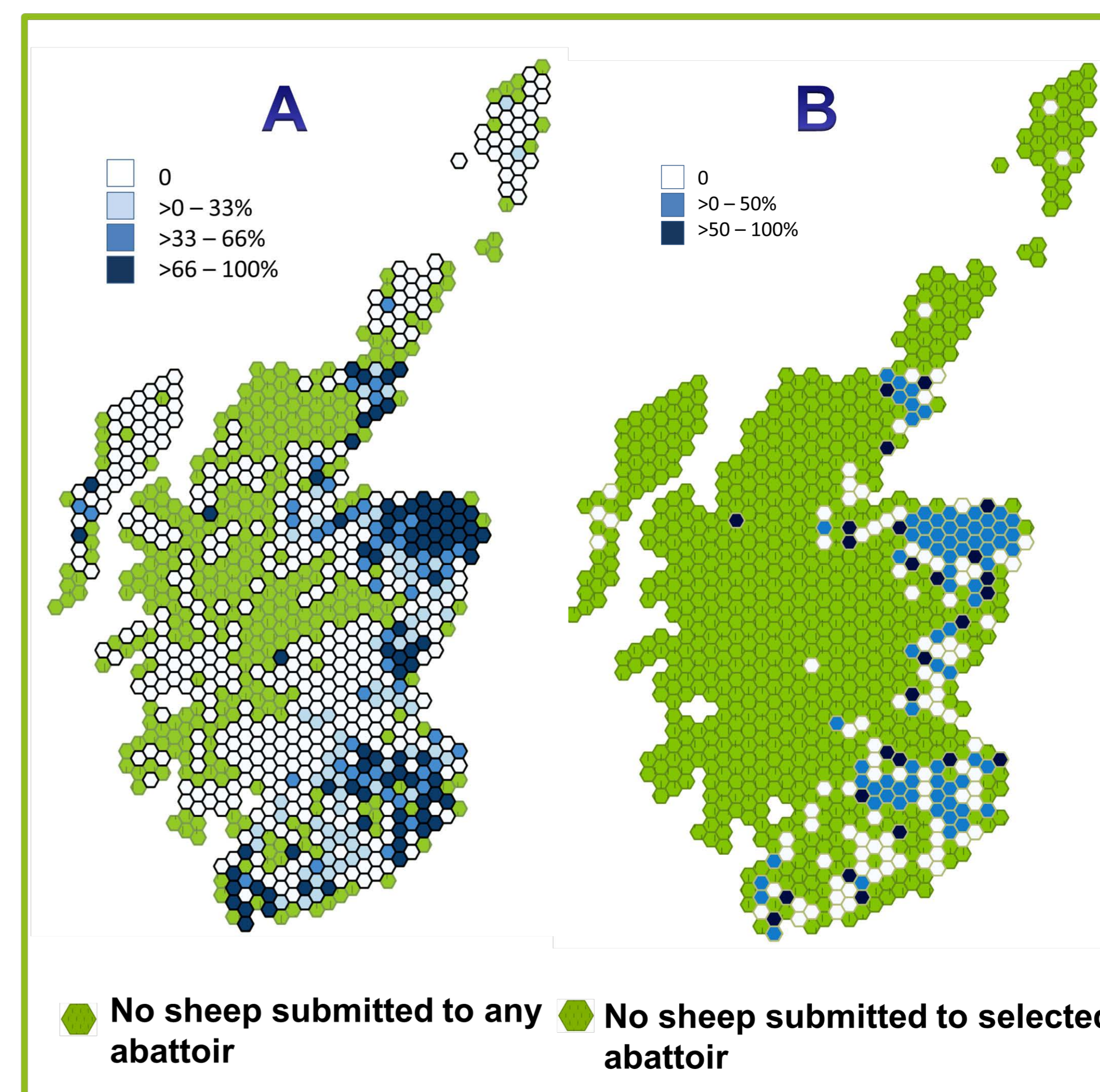
	Abattoir isolates tested by PCR	
total tested	388	
total positive	6 (1.5%)	
Target gene		Antibiotic (or class)
<i>tetO</i> pos	0	tetracycline
<i>bla_{TEM}</i> pos	6 (1.5%)	β- lactam includes ESBL
<i>bla_{CTX}</i> pos	0	
<i>bla_{CMY}</i> pos	0	
<i>bla_{SHV}</i> pos	0	
<i>ermB</i> pos	0	erythromycin
<i>mcr-1</i> pos	0	colistin

Field flock extracts tested by PCR

The only genetic resistance markers detected were for erythromycin and tetracycline.

The ovine population tested for AMR was similar to the abattoir catchment area; however, the catchment area was not entirely representative of the Scottish slaughtered sheep population.

Fig 1. Density Maps Showing Areas Supplying Sheep To Selected Abattoir.



A Catchment area of abattoir: percentage of all the sheep slaughtered in Scotland from a cell that were slaughtered in this abattoir.

B The distribution of holdings that supplied sheep, which were tested for AMR in the abattoir study: within each cell, the percentage of holdings tested of those that send sheep to this abattoir from that cell.