



Introduction

A zoonosis is a disease of animals which can be transmitted to humans. The spread of zoonoses is an important public health concern, particularly with regards to the spread from companion animals with which we often have particularly close contact and share recreational areas. A recent study demonstrated the presence of antibiotic resistant strains of zoonotic bacteria in dog faeces which could provide a reservoir of antibiotic resistant genes capable of being passed onto naïve hosts (Wedley *et al.* 2017).

The spread of disease from dog fouling is an important issue because of the overlap of recreational areas. There has been some evidence to show that dogs that are fed a raw diet may be carriers of potential zoonotic pathogens such as *E. coli*, *Salmonella*, *Campylobacter* and *Yersinia* sp. (Lefebvre *et al.* 2008). Good hygiene practise would prevent spread however, during recreational activities such as some sports (e.g. rugby where contact with the soil is common) or where children are playing these practises are not always adhered to.

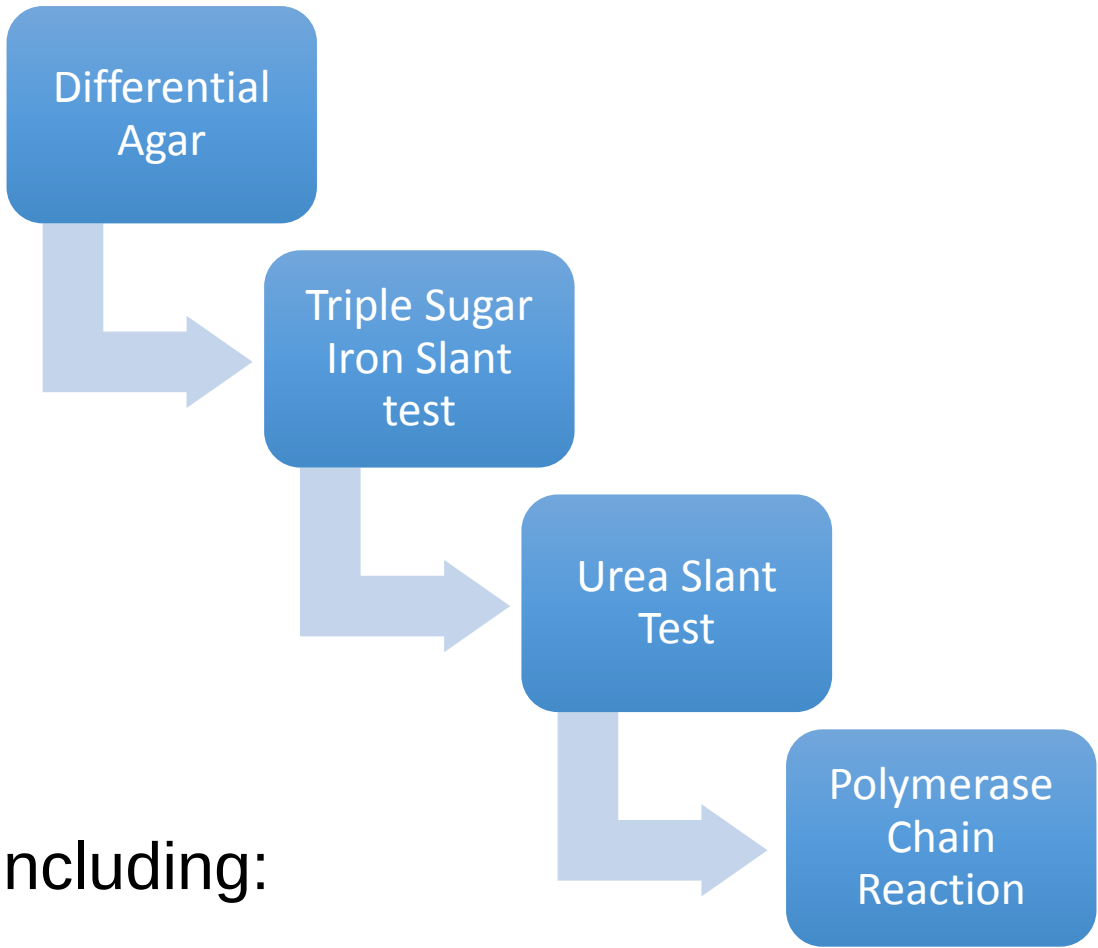
Aims

- 1) Determine the prevalence of zoonotic bacteria in dog faeces collected from parks in Cambridge and to determine whether these bacteria are resistant to some classes of antibiotics
- 2) Identify the disease causing agents using differential agar and biochemical techniques.
- 3) Confirm identification using polymerase chain reaction with specific primers for *E. coli*, *Salmonella* sp., *Campylobacter* sp. and *Yersinia* sp.
- 4) A preliminary look at the antibiotic resistance of isolates to common antibiotics.

Method

- ❑ Sample collection:
 - 50 samples were collected from three locations in Cambridge
 - Amies transport swabs were used to collect samples.
 - Samples were processed within 24 hours

❑ Organism Identification



❑ Differential agar, including:

- Xylose lysine deoxycholate agar
- Salmonella chromogenic agar
- Campylobacter agar
- MacConkey agar
- Eosin methylene blue agar

❑ Antibiotic disc testing:

- Ampicillin
- Oxacillin
- Cefuroxime
- Ciprofloxacin
- Trimethoprim
- Meropenem

Results

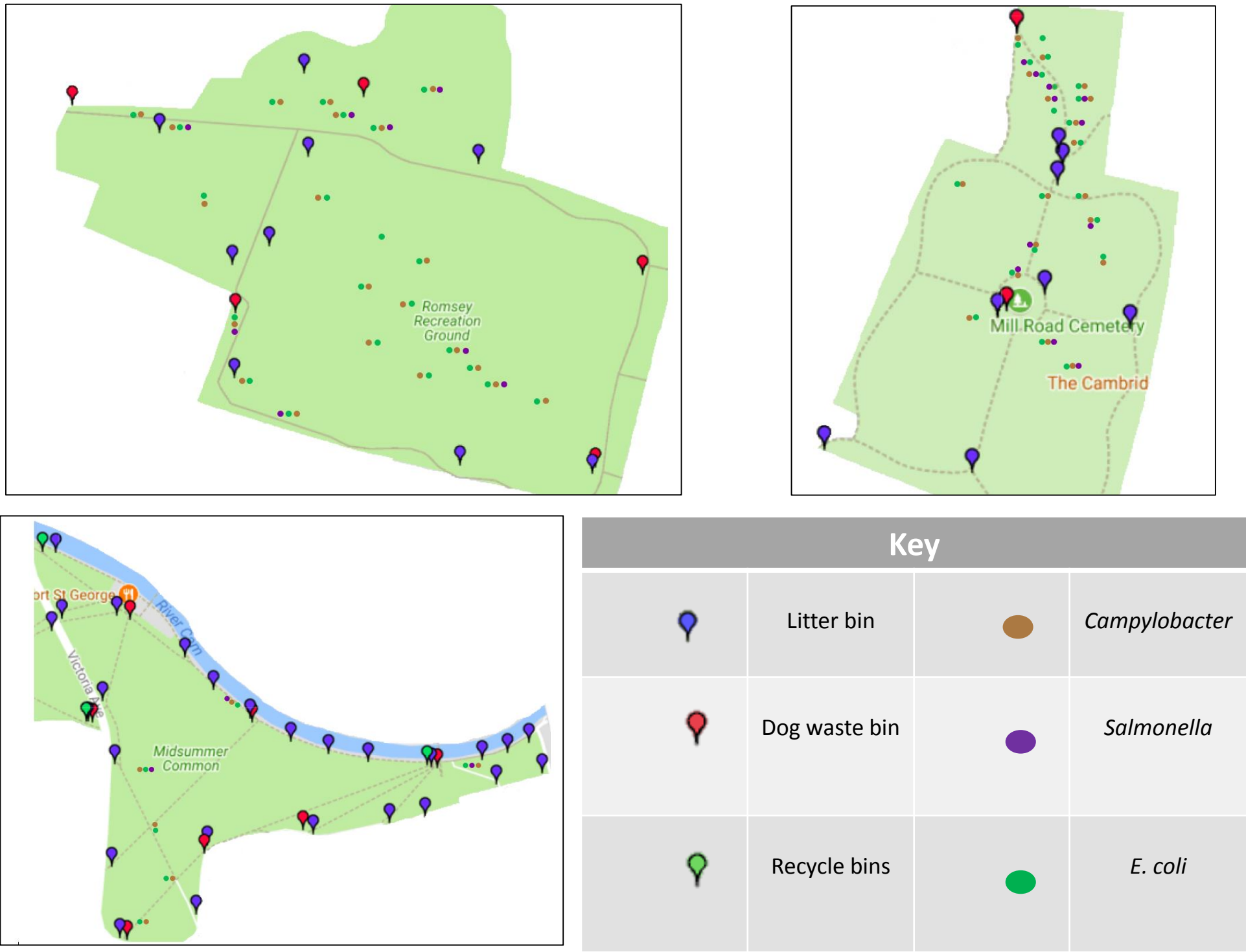


Image adapted from (Cambridge.gov.uk, 2017)

Figure 1: Total isolates of *E.coli*, *Salmonella* and *Campylobacter* found from three different recreational parks within Cambridge. Including litter, recycling and dog waste bins relative to the isolates location.

Isolates:

- *E.coli* – 49/50 (98%)
- *Campylobacter* sp. – 45/50 (90%)
- *Salmonella* sp. – 22/50 (44%)
- *Yersinia* sp. – 0/50

Figure 2: Number of positive isolates with associated percentage

Table 1: Antibiotic Resistance Profiles

Antibiotic	<i>E.coli</i>	<i>Salmonella</i>
Ampicillin	33%	60%
Oxacillin	100%	100%
Cefpodoxime	0	67%
Ciprofloxacin	0	33%
Trimethoprim	33%	60%
Meropenem	0	40%

Discussion

As expected faecal samples contained many different bacteria some of which are part of the normal canine gut microbiota. However, interestingly we isolated zoonotic bacteria from all of our sampled sites (Figure 2). The results demonstrate some antibiotic resistance (Table 1). The findings from this preliminary study warrant a further in depth study. This is because there is a potential risk to public health which should be monitored to prevent the spread of antibiotic resistant strains of zoonotic pathogens.

Further Work

Carryout a nationwide study to investigate the prevalence of zoonotic bacteria in recreational areas. Identify their mechanisms of resistance, particularly to see whether these are plasmid borne. This will help us to determine whether resistance can spread between species or genera of bacteria. In order to achieve this we would complete conjugation experiments.

References

Cambridge.gov.uk. (2017). Litter and dog bins map | Cambridge City Council. [online] Available at: <https://www.cambridge.gov.uk/litter-and-dog-bins-map> [Accessed 1 Sep. 2017].

Wedley, A. L., Dawson, S., Maddox, T. W., Coyne, K. P., Pinchbeck, G. L., Clegg, P., Nuttal, T., Kirchner, M. and Williams, N. J. 2017. Carriage of antimicrobial resistant *Escherichia coli* in dogs: Prevalence associated risk factors and molecular characteristics. *Veterinary Microbiology*, 199, 23- 30.

Lefebvre, S.L., Reid-Smith, R., Boerlin, P and Weese, J.S. 2008. Evaluation of the risk of shedding *Salmonellae* and other potential pathogens by therapy dogs fed raw diets in Ontario and Alberta. *Zoonoses and Public Health*, 55, 470–480.