

Intestinal and Extra-Intestinal Pathogenic *Escherichia coli* in Rainwater Tanks

Ahmed W ¹, Rodgers L ¹, Masters N ², Sidhu JPS ¹, and Toze S ¹

¹ CSIRO Land and Water, Ecosciences Precinct, 41 Boggo Road, Brisbane 4102; ² Faculty of Science, Health and Education, University of the Sunshine Coast, Maroochydore, DC, Queensland 4558

Introduction

☐ *E. coli* has been used as an indicator of faecal contamination in rainwater tanks.

☐ *E. coli* can be pathogenic and responsible for both intestinal and extraintestinal infections.

Warm-blooded animals may contain high numbers of *E. coli* carrying virulence genes (VGs) which allow *E. coli* to cause infections.

Aim

☐ The presence of 20 VGs associated with intestinal (InPEC) and extra-intestinal (ExPEC) pathogenic *E. coli* in rainwater tanks in Southeast Queensland (SEQ), Australia was investigated.

Materials and Methods

☐ Up to 10 *E. coli* isolates were selected from each of 22 rainwater tanks (total of 200 isolates).

☐ 40 faecal samples were collected from possums ($n=20$) and various species of birds ($n=20$).

Table 1: List of *E. coli* Virulence genes (VGs) tested in this study

Pathotypes	Virulence genes					
	Adhesins	Toxins ^a	Invasins	Sidephores	Capsule synthesis	Additional virulence genes
STEC	<i>eaeA</i> *	<i>stx</i> ₁ <i>stx</i> ₂ <i>hlyA</i> *				
ETEC		LT1 ST1				
EPEC	<i>eaeA</i> *	<i>cdtB</i> * <i>hlyA</i> *				
ExPEC	<i>bmaF</i> <i>papG</i> alleleII	<i>cdtB</i> * <i>cvaC</i>	<i>ibeA</i>	<i>iutA</i>	<i>kpsMT</i> III <i>kpsMT</i> K1	PAI <i>traT</i>
	<i>papG</i> allele III <i>papAH</i> <i>papEF</i> <i>focG</i>					

*Indicates genes shared by more than one *E. coli* pathotype.
^a Animal faecal samples were tested for these genes.

Results

☐ Among the 20 VGs tested, 10 (50%) genes were detected in 17 (77%) rainwater tanks.

☐ *eaeA* belonging to EPEC and STEC and ST1 belonging to ETEC were detected in 36% and 23% tanks. VGs belonging to ExPEC were detected in 68% of the tanks.

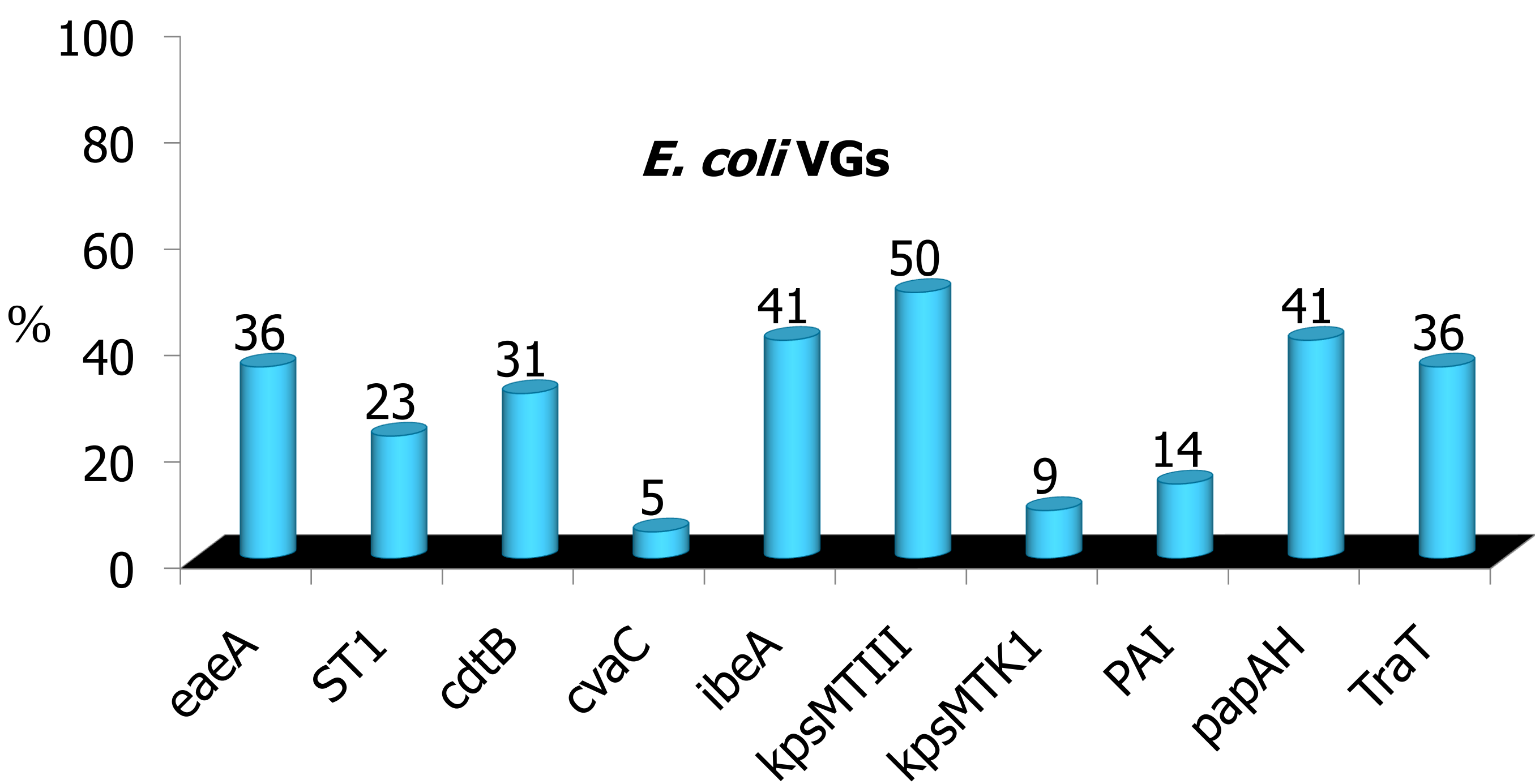


Figure 2: Percentage of rainwater tanks positive for InPEC and ExPEC VGs



☐ *stx*₂ and *cdtB* toxin genes were detected in 5% and 10% possum faecal samples, respectively.

☐ 15%, 5%, 5% and 15% bird faecal samples were positive for *stx*₂, *stx*₁, ST1 and *cdtB* toxin genes.

Conclusions

☐ The significance of these strains in terms of health implications needs to be assessed by comparing strains from rainwater tanks and feces of the householders drinking rainwater.

☐ Better characterisation of these strains is required by serotyping, genotyping or testing for multiple drug resistance from rainwater and stools from the householders.



Figure 1: Rainwater tanks sampled in this study