

## ABSTRACT

A Study on the Prevalence and Characteristics of Verocytotoxigenic *Escherichia coli* (VTEC) in Livestock, Farm dogs, Dairy Farmers and the Environment on Selected Dairy Farms in Trinidad

R. Roopnarine

A cross-sectional study was conducted to determine the prevalence and characteristics of verocytotoxigenic *Escherichia coli* (VTEC) on 25 dairy farms each located in Waller field and Carlsen Field farming areas in Trinidad.

On each selected farm, faecal samples were collected from cows, calves and humans; rectal swabs from pet farm dogs and bulk milk and effluent (drainage water) samples were also collected. Plating by standard methods on differential media and the use of the immunomagnetic separation (IMS) detected *E. coli* O157 serogroup. A vero cell assay was used to detect both verocytotoxin (VT) and heat labile toxin (LT) production and the polymerase chain reaction (PCR) detected VT, LT, *rfbE*, ST1a, IAL and *eae* genes. The dryspot test was also used to detect both *E. coli* O157 serogroup and non-O157 VTEC strains and the Kirby-Bauer disc diffusion method was used to detect resistance to eight antimicrobial agents.

*Escherichia coli* was recovered at significantly ( $P < 0.05$ ;  $\chi^2$ ) different rates from cows (76.2%), calves (87.2%), humans (51.4%), farm dogs (70.0%), bulk milk (18.8%) and effluent (60.0%) samples. Of 933 *E. coli* isolates from direct plating, 8 (0.9%) were *E. coli* O157 serogroup.

Using the vero cell assay, the frequency of VT producing isolates detected amongst *E. coli* isolates from cows, calves, farm dogs and humans was 16.6 %, 14.6 %, 3.2 % and 7.1 % respectively ( $P < 0.05$ ;  $\chi^2$ ). Frequency of heat labile toxin (LT) producing isolates was highest amongst *E. coli* isolates from calves (10.8%) and lowest (0.0 %) amongst those isolates from humans and bulk milk ( $P < 0.05$ ;  $\chi^2$ ). Overall, PCR detected VT genes in 11.0 %, 35.9 %, 1.4 % and 8.8 % faecal samples from milking cows, calves, humans and farm dogs respectively ( $P < 0.001$ ;  $\chi^2$ ).

The VT, LT and *eae* genes were detected by PCR in 62.3%, 4.9% and 1.6% respectively of 61 VT-producing *E. coli* isolates ( $P < 0.05$ ;  $\chi^2$ ). Amongst the 45 isolates that were VT- producers, VT, LT and/or *eae*-gene positive, 2.2%, 2.2%, 4.4% and 6.7% belonged to serotypes O91, O111, O103 and O157 respectively as determined by the Dryspot test.

Amongst 250 samples tested by the IMS, only 1.2 % were positive for *E. coli* O157 serogroup, comprising 2.2 % of cows' faeces and 16.7% of bulk milk from Carlsen Field.

In Waller field, 70.0 % of the *E. coli* isolates exhibited resistance to one or more antimicrobial agents compared with 83.5% of the isolates from Carlsen Field ( $P < 0.001$ ;  $\chi^2$ ). Across the farms tested, the frequency of resistance of isolates was highest to streptomycin (72.7%) and lowest to the fluoroquinolones (0.2%).

In Trinidad, VTEC strains in humans, VT genes and non-O157 VTEC serotypes in *E. coli* are being documented for the first time, with public health implications. The rather high prevalence of resistance to streptomycin and oxytetracycline amongst *E. coli* isolates, may have zoonotic implications.

**Keywords:** Rohini Roopnarine; prevalence; VTEC; *E. coli*