

Isolation and Characterization of Shiga toxin-Producing *Escherichia coli* (STEC)  
Serogroups O26, O45, O103, O111, O113, O121, O145 and O157 shed from Range and  
Feedlot Cattle from Post-weaning to Slaughter

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Abstract

Cattle are the main reservoirs for Shiga toxin-producing *Escherichia coli* (STEC) strains. *E. coli* O26, O45, O103, O111, O121, O145, and O157 are among the STEC serogroups that cause severe foodborne illness and have been declared as adulterants by the United States Department of Agriculture, Food Safety and Inspection Service. The objectives of this study were (1) to estimate the prevalence of non-O157 STEC and *E. coli* O157 in naturally infected beef cows, and steer calves at post-weaning, during finishing and at slaughter, and (2) to test non-O157 STEC isolates for the presence of virulence genes, including *stx1*, *stx2*, *eaeA*, and *ehlyA*. Samples were collected from study animals over multiple sampling periods and included fecal grabs, rectal swabs and mid-line sponge samples. Laboratory culture, polymerase chain reaction (PCR), and multiplex PCR were performed to recover and identify *E. coli* and the virulence genes. The prevalence of non-O157 STEC (O26, O45, O103, O111, O121, O113 and O145) fecal shedding varied from 8% (4/48) to 39%

(15/38) in cows, and from 2% (1/47) to 29% (7/24) in steer calves. The prevalence of *E. coli* O157 fecal shedding varied from 0% (0/38) to 52% (25/48) in cows, and from 0% (0/38) to 50% (24/48) in steer calves. In steer calves, the prevalence of non-O157 STEC and *E. coli* O157 was highest at post-weaning, 13% (12/96) and 23% (22/96), respectively. Among the non-O157 STEC isolates, 78% (164/211) had *stx1* and 78% (165/211) had *stx2* genes. The percentage of non-O157 STEC isolates encoding the *eaeA* gene was low; of the 168 isolates tested, 9 (5%) were positive for *eaeA* and 138 isolates (82%) were positive for *ehlyA*. Findings from this study provide further evidence of non-O157 STEC shedding in steer calves particularly at the stage of post-weaning, thereby highlighting the potential food safety risk at the post-harvest level.

**Key words:** *Escherichia coli*, Shiga-toxin producing *Escherichia coli*, non-O157 STEC, cattle, beef, feedlot, prevalence