A study of enterohemorrhagic *Escherichia coli* in beef cow-calf herds in Mississippi and Nebraska

L. G. Schneider,[1] BS ; **Z. R. Stromberg**,[2] PhD; **G. L. Lewis**,[2] MS ; **R. A. Moxley**,[2] DVM, PhD; **D. R. Smith**,[1] DVM, PhD, DACVPM
[1]College of Veterinary Medicine, Mississippi State University, Mississippi State, MS 39762
[2]School of Veterinary Medicine and Biomedical Sciences, University of Nebraska-Lincoln, Lincoln, NE 68588

Introduction

The objective of this study was to describe the probability of detecting seven serogroups of enterohemorrhagic *Escherichia coli* (EHEC-7) of public health importance in fecal samples from beef cow-calf herds and to identify explanatory factors.

Materials and Methods

Fresh manure samples (n = 85) from two herds in Mississippi and two herds in Nebraska were collected seasonally for a total of 1,360 fecal samples. Samples were tested for EHEC by a molecular screening assay. Separate management groups within herds were sampled, and group-level factors were recorded including region, season, diet, calving season, presence of calves, water source, high temperature (°C) on the day of sampling, and if a precipitation event occurred within 7 days prior to sampling. To measure the effects of factors on fecal shedding of EHEC-7, separate multivariable logistic regression models were used, accounting for the random effect of clustering by group. Statistical significance was set $\alpha = 0.05$.

Results

Numerically, the greatest prevalence of detection of every EHEC serogroup occurred in the summer samples. In total, 59 of 1,357 samples (4.3%) were positive for EHEC O26, ranging from 0 to 88% within groups at a point in time. In the multivariable model, region was significantly associated with probability to detect EHEC O26. There were increased odds to detect EHEC O26 in Nebraska herds compared to Mississippi (OR = 16.4, 95% CI: 1.2, 200). In total, 44 of 1,357 samples (3.2%) were positive for EHEC O45, ranging from 0 to 49% within groups at a point in time. Probability to detect EHEC O45 was associated with the high temperature on the day of sampling and the presence of a precipitation event. For every 1° temperature increase, odds for detection increased (OR = 1.1, 95% CI: 1.0, 1.2). Odds for EHEC O45 detection decreased if a precipitation event occurred (OR = 0.05, 95% CI: 0.004, 0.52). In total, 66 of 1,357 samples (4.9%) were positive for EHEC O103, ranging from 0 to 41% within groups at a point in time. Probability to detect EHEC O103 was associated with season and the greatest probability occurred in the summer. In total, 71 of 1,357 samples (5.2%) were positive for EHEC O111, ranging from 0 to 51% within groups at a point in time. Probability to detect EHEC O111 was associated with region and high temperature. Odds of detection were increased in Nebraska compared to Mississippi (OR = 7.8, 95% CI: 1.3, 47.6), and as temperature increased 1°, odds for detection increased (OR = 1.3, 95% CI: 1.1, 1.6). In total, 43 of 1,357 samples (3.2%) were positive for EHEC O145, ranging from 0 to 69% within groups at a point in time. The probability to detect EHEC O145 was associated with season, where greatest probability for detection was in the summer. In total, 18 of 1,357 samples (1.3%) were positive for EHEC O121, ranging from 0 to 37.2% within groups at a point in time. In total, 68 of 1,357 samples (5.0%) were positive for EHEC O157, ranging from 0 to 86% within groups at a point in time. We failed to detect any explanatory factors associated with EHEC O121 or EHEC O157.

Significance

These results indicate that there is great variation in prevalence of EHEC-7 by time and place in cow-calf herds. Factors that vary by time and place, such as precipitation, ambient temperature, region, and season, are associated with the probability to detect EHEC-7 in fresh feces collected from cow-calf herds.