

DIAGNOSTIC STRATEGIES TO CLASSIFY PENS BY THE PREVALENCE OF FEEDLOT CATTLE SHEDDING *ESCHERICHIA COLI* O157:H7

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Currently there is a lack of field-validated methods to monitor livestock for the presence of food safety pathogens for use in research or on-farm HACCP programs.¹ The objective of this study was to evaluate diagnostic strategies to efficiently identify pens of feedlot cattle with a high prevalence of cattle shedding *Escherichia coli* O157:H7.

Materials & Methods

Twenty-nine feedlot pens from 5 Midwestern US feedlots were each studied once during the June-September study period. Seven pen-test devices that cattle rubbed, licked and chewed were placed in the pens the evening prior to sample collection. Feces were collected from the rectum of all cattle in each pen and concurrent samples were collected of pen-test devices and a single composite sample of 20 fresh fecal pats from the pen surface. Culture methods were specific to the type of sample but included selective enrichment, immunomagnetic separation and isolates were confirmed by standard methods including PCR.

Results

Pen size ranged from 36 to 231 (median 107) cattle. *E. coli* O157:H7 was isolated from at least 1 animal from all 29 pens. The percentage of cattle shedding detectable levels of the organism within a pen ranged from 0.7% to 79.8% (median 17.1%). *E. coli* O157:H7 was recovered from at least one pen-test device from 15 pens and from the composite fecal samples of 8 pens (Figure 1). Recovery of *E. coli* O157:H7 from at least one pen test device or from the composite fecal sample was more likely to occur from the higher prevalence pens (Wilcoxon rank sums $p=0.001$).

The use of pen-test devices and composite feces were evaluated as diagnostic tools to differentiate high prevalence pens from low prevalence pens. Culture of the pen-test devices were optimally efficient as a pen-test (greatest percentage of pens classified correctly) if pens were distinguished as high or low prevalence at a cut-off point of 16 percent prevalence (pen-level sensitivity = 82%, pen-level specificity = 92%). Culture of composite feces was optimally efficient as a pen-test if pens were

distinguished as high or low prevalence at a cut-off point of 37 percent prevalence (pen-level sensitivity = 86%, pen-level specificity = 91%).

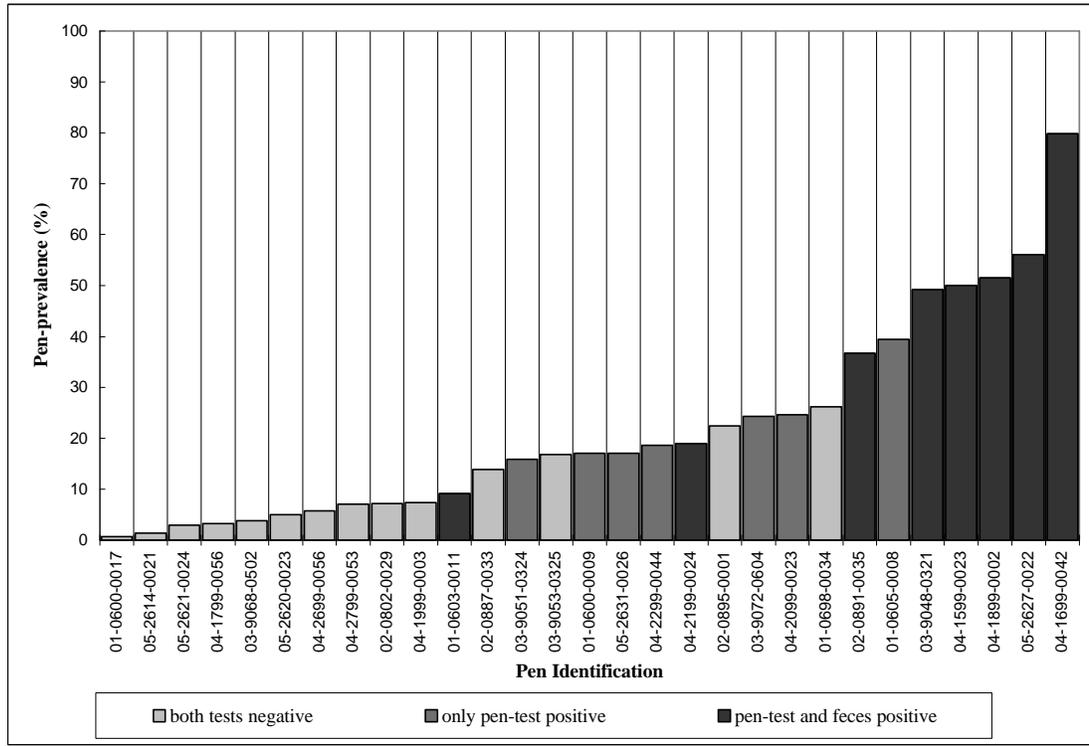


Figure 1. The relationship between the *Escherichia coli* O157:H7 culture results of the pen-test device and a composite fecal sample collected from the pen to the percent of cattle in the pen shedding detectable levels of the organism in rectal feces.

Discussion

Culture of the pen-test devices alone or in parallel with culture of a composite fecal sample may be a diagnostically efficient strategy to characterize *E. coli* O157:H7 fecal shedding in feedlot pens. This diagnostic strategy may be useful as a research tool or as a monitoring tool in the development of animal production food safety programs.

References

1. Gardner IA. Testing to fulfill HACCP (Hazard Analysis Critical Control Points) requirements: principles and examples. J Dairy Sci 1997; 80:3453-3457.