Carcass Mapping to Determine *E. coli* O157:H7 Distribution on Beef Carcasses

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Carcass Mapping to Determine *E. coli* O157 Distribution on Beef Carcasses:
Project Summary

Background
Past research conducted by this institution found that a relatively high number of beef carcasses tested positive for *E. coli* O157:H7 in areas on the carcass not traditionally sampled. This research indicated there was a need to do more work to determine pathogen contamination patterns on beef carcasses. A better understanding of pathogen distributions on carcasses may allow for better optimization of in-plant safety interventions.

Methodology
Samples were collected from three beef processing plants in geographically distinct areas over the course of a year. All of the plants in the study utilize safety interventions on beef carcasses prior to the chilling stage. A total of four sites, as well as hides, were sampled on each carcass (foreshank, hindshank, midline from the cod to the brisket, and the inside round area). These four sites were sampled at pre-evisceration (before the carcass is split), before the application of safety interventions (after the carcass is split) and after interventions were applied (in the hot box). A total of 10 samples per each carcass location were collected throughout the afternoon and subsequent morning of two processing days at each of the three plants. A total of 5,760 carcass samples were collected (three processing plants; four seasons; three plant sampling locations; four carcass sampling locations; 10 carcass samples and four hours of collection per plant).

Hide samples were collected at a rate of 10 per hour of sample collection for a total of 40 samples per plant visited. This resulted in a total of 480 hide samples collected during the entire year of data collection (three processing plants; four seasons; 10 hide samples and four hours of collection per plant).

All carcass and hide samples were initially subjected to composite testing for the presence of *E. coli* O157:H7. If *E. coli* O157:H7 was present in the composite sample, individual samples were analyzed.

Findings
Not all of the sampling is complete; however, the researchers have conducted analyses on samples collected to date. A total of 105 of 4,650 (2.26 percent) of carcass samples were positive for *E. coli* O157 and 95 of 370 (25.68 percent) of the hide samples were positive.

Of all of the pre-evisceration carcass sampling locations, the hindshank was the most contaminated with 6.76 percent of the samples testing positive, followed by the inside round at 3.51 percent. Very few positive samples (less than 1.5 percent) were recovered from the foreshank and midline.

Of the “before intervention” sampling locations, the midline was the most contaminated with 5.95 percent of the samples testing positive, followed by the inside round with 4.05 percent and the hindshank with 2.70 percent. Very few positive samples (less than 1 percent) were recovered from the foreshank at the “before intervention” stage.
Of the “after intervention” carcass sampling locations, the inside round was the most contaminated with 2.35 percent of the samples testing positive, followed by the hindshank with 1.47 percent. No positive samples were recovered from the foreshank or midline.

The researchers concluded from these results that regardless of the processing stage, the inside round, midline and hindshank are more susceptible to contamination. Subsequent reduction of the pathogen on the midline indicates that safety interventions are effective in this location, but potentially not on the inside round and hindshanks.

**Implications**
The ability to identify patterns of pathogen contamination on carcasses in processing plants will allow safety interventions to be implemented more effectively by targeting areas of high contamination. This should result in further reductions of *E. coli* O157:H7 in the beef supply.

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