

Impact of intervention failures and vaccination on beef carcass *E. coli* O157 contamination

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Substantial progress has been made in decreasing the contamination of beef with *Escherichia coli* O157. Previous efforts have focused primarily on slaughter interventions to decrease contamination. Still, occasional contaminated lots of meat are detected and outbreaks continue to occur. These contaminated lots are hypothesized to occur during ‘event’ days when several control failures converge to produce the contaminated lot of meat. This may be due to a combination of increasing quantity of O157 entering the slaughter facility on cattle, increased transfer from hides to carcasses, or the failure of control methods within the slaughter facility. Recently, vaccines have emerged as a tool in pre-harvest O157 control. Data indicate vaccines decrease prevalence and shedding concentration however they may also impact hide prevalence and concentration. Utilizing @Risk in Microsoft Excel we incorporated data from published scientific literature into a Monte-Carlo framework to estimate the prevalence and concentration of carcass contamination with *E. coli* O157 with and without vaccination and following a series of slaughter control failures. Vaccine efficacy was modeled based on published scientific literature. Additionally, the model examined the impact of a possible vaccine effect on hide prevalence and concentration of O157 on arrival at the slaughter facility. High hide to carcass transmission of O157 and low efficacy of carcass intervention in the slaughter process were modeled as control failures. Slaughter control failures markedly increased and vaccination decreased carcass O157 prevalence and concentration however the majority of the decrease was related to the potential impact on hide prevalence and concentration. These results indicate the need for research to evaluate the full range of vaccine effects in the value of vaccination to pre-harvest beef production.