RESEARCH ABSTRACT

PUBLIC HEALTH/WORKER SAFETY

Title: Impact of ceftiofur use on the dissemination of resistant enteric bacteria in finishing swine populations - **NPB # 10-138**

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Scientific Abstract:

Conveying resistance to penicillins and critically important cephalosporin drugs, the extended-spectrum β-lactamase bacterial resistance gene *bla*$_{CTX-M}$ was first described in US livestock in 2010 and characterized in dairy cattle populations in 2011. It has been hypothesized that the dissemination of *bla*$_{CTX-M}$ is a product of selection pressure from the veterinary use of third and fourth generation cephalosporins in food animals. Our objectives were to estimate the frequency and distribution of coliform bacteria harboring *bla*$_{CTX-M}$ in fecal flora of finishing swine populations in the US, and to characterize the CTX-M alleles, their plasmidic contexts, and the genetic diversity of the bacterial isolates. We also evaluated the association between barn-level ceftiofur use and the likelihood of recovering extended-spectrum cephalosporin resistant bacteria in these populations. We collected approximately 30 fecal samples from each of 50 finishing barns located in 5 US states. We recovered *E. coli* or *K. pneumoniae* containing *bla*$_{CTX-M}$ from 24 of 1495 (1.6%) fecal samples in 8 of 50 (16%) barns. Twelve of 30 (40%) samples from a single barn in MI produced *E. coli* containing *bla*$_{CTX-M-1}$ on IncN sequence type 1 plasmids. An additional 5 positive barns were in OH and yielded between 1 (3.3%) and 3 (10%) *E. coli* containing *bla*$_{CTX-M-1}$ or *bla*$_{CTX-M-15}$ on IncF plasmids. The 10 OH isolates also expressed chromosomally-mediated fluoroquinolone resistance. The remaining 2 isolates were *Klebsiella pneumoniae* carrying *bla*$_{CTX-M-1}$ recovered from 2 barns belonging to one company in Illinois. Pigs in most (82%) barns had received prophylactic ceftiofur treatment as piglets in either the farrowing or nursery facilities prior to the finishing phase of production. In addition, up to 8.7% of individual pigs in approximately half (48%) of finishing barns received therapeutic ceftiofur to treat acute disease. We were unable to detect an association between ceftiofur use and the probability of recovering *bla*$_{CTX-M}$ *E. coli*.