Recent Emergence and Rapid Dissemination of *bla*$_{CTX-M}$ among Dairy Calves in Washington State

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Resistance of zoonotic enteric pathogens to 3rd generation cephalosporins is recognized as a significant public health problem. Until recent years, the majority of 3rd generation cephalosporin resistance among gram-negative bacteria from bovine hosts in the United States was associated with *bla*$_{CMY-2}$ genes. Retrospective assay of dairy calf *E.coli* from previous field studies using ceftiofur selective plating failed to detect any *bla*$_{CTX-M}$-positive isolates obtained in 2002 (5 farms, 93 isolates) and 2008 (4 farms, 82 isolates). The earliest detection of *bla*$_{CTX-M}$ *E. coli* from Washington dairies was in isolates obtained in 2011, suggesting a recent local emergence.

To determine the extent of *bla*$_{CTX-M}$ *E. coli* dissemination in 2012, individual fecal samples from preweaned calves and pooled fecal samples from adult cows at 30 Washington dairy farms were collected and a questionnaire covering farm management and antibiotic use was administered to dairy operators. Selection for ESBL and AmpC phenotypes and genotypes was carried out as previously described (Mollenkopf AEM 2012;78:4552-60). Isolates from cefepime- and cefoxitin-supplemented plates were PCR-tested for *bla*$_{CTX-M}$ and *bla*$_{CMY-2}$, respectively.

803/1169 (68.7%) calf samples and 66/119 (55.5%) adult cow samples yielded growth on cefepime. 1087/1169 (92.5%) calf and 112/119 (94.1%) cow samples yielded growth on cefoxitin. Prevalence of *bla*$_{CMY-2}$ ranged from 29.0% to 100% and was not correlated with prevalence of cefepime resistance or *bla*$_{CTX-M}$. Presence of *bla*$_{CTX-M}$ correlated highly with cefepime resistance so the latter was analyzed. Cefepime prevalence ranged from 0 to 100% (median 75.0%). Management factors that were not significantly associated with cefepime resistance included calving pen management, feed importation, treatment crew hygiene, herd size, frequency of visits to the farm, and ceftiofur use. Factors that were significant at a level of $P \leq 0.10$ (Wilcoxon test) included frequency of adding fresh calf hutch bedding, and region (northwest v. south central Washington).

Our findings included a high, widespread prevalence of *bla*$_{CTX-M}$ *E. coli* in dairy calves and a concurrent high prevalence of *bla*$_{CMY-2}$. No significant associations were found with management factors, although calf hutch bedding, region and animal movements may play a role.