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Dynamic of Salmonella spp. in Dairy Herds and the Risk to Watershed Ecosystem

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Abstract:

We carried out a population follow-up study to determine the occurrence of Salmonella spp. in dairy herds in watersheds and shed light on the factors that play role in the likelihood of perpetuation of this organism among animals on these farms. The primary goal was to understand the dynamic of infection among cattle so that cost-effective recommendation could be implemented to protect the watershed ecosystem from degradation as a result of occurrence of this pathogen. Fecal samples are being collected per rectum from a representative sample of cattle on these operations and tested for the presence of Salmonella spp. using a combination of bacteriological enrichment and molecular detection. Data related to host, and environmental factors associated with the likelihood of introduction, perpetuation, and fate of these pathogens in the watershed ecosystem. The data are been collected by personal interview of the farms' owners and analyzed using the random effect logistic regression model to adjust for the hierarchy in the data. Because the sampling units, animals, are grouped by farms, it was assumed that this grouping would lead to a correlation in the likelihood of positive results for Salmonella spp. Ignoring the intracluster correlation in the analysis could lead to incorrect estimates of the effect sizes, confidence intervals that are too small, and biased estimates, and hence incorrect interpretation of associations between the occurrence of the organism and the type of sample. It was assumed that the unobserved risk factors were randomly distributed among farms and the overall significance of this assumption was evaluated by using a mixed-effect logistic regression model.

Analyses of the data to date demonstrated that Salmonella spp. occurs at a relatively low proportion among animals in the study population and there are several factors that are associated with its occurrence.

Impact Statement:

We learn that Salmonella spp. is prevalent among cattle in watershed at a relatively low incidence. There were several factors associated with the likelihood of this organism in the target population. Some of these factors exacerbate the risk of shedding while other mitigates the likelihood of the organism. Some of these factors exert their effect at the animal level while the other factors were related to management. Modification of some of these factors is likely to reduce the likelihood of shedding of Salmonella significantly in our study population.

We were able to secure additional funding for the USDA-Formula Funds through our research station to examine other water and foodborne pathogens in same targeted population in the same samples that are collected for this study. The other pathogens that are been added to the project because of this additional funding are Escherichia coli and Campylobacter spp.

Category: Other Water Resource Topics
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