Managing the Risk of Cryptosporidium and Salmonella spp. in Watersheds

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Abstract: Nonpoint Source Contamination—The Risk of Cryptosporidium spp. in Watersheds, Hussni O. Mohammed and Susan E. Wade

Cryptosporidium parvum is a coccidian protozoan that has zoonotic significance. Species of this protozoan are known to contribute significantly to the calf-hood morbidity and mortality and hence is become an economic liability to many dairy and beef herds. In addition to its negative impact on the efficiency of animal production, it has emerged as one of the most significant waterborne pathogens causing enterocolitis in humans worldwide. Because of the broad host spectrum of this pathogen, inefficiencies of the common drinking water treatment methods, and the lack of reliable therapy in humans, *Cryptosporidium parvum* is considered one of the major threats found in a to the water supply system.

We carried out a probabilistic risk assessment for the contamination of a drinking water supply system with zoonotic *Cryptosporidium* spp. from nonpoint sources for a watershed in New York State. Genotypes of *Cryptosporidium* spp. were identified using PCR and genetic sequencing techniques. There are many agricultural sources that could contribute to the contamination of the water supply systems including dairy cattle operations and associated farming activities, wildlife, and sewage treatment plants. The fault tree scenario pathway approach was used to assess the likelihood of contamination of the water supply in the watershed with zoonotic genotypes of Cryptosporidium. Estimates of the parameters used in the risk assessment model were obtained from our studies and from the literature. The analysis demonstrated the importance of the farming activities in mitigating the risk of this protozoan associated with dairy cattle and highlighted the role of sewage treatment plants.

Project Output:

We learn more about the potential sources for water quality degradation associated with zoonotic strains of *Cryptosporidium* in watersheds. Several factors were identified to play a role in exacerbating the risk of water contamination with zoonotic strains of Cryptosporidium originated from animals. Modification of these factors is likely to mitigate the risk associated with them and hence preserve the water quality at the watershed level and beyond.

We were able to secure additional funding from the Environmental Protection Agency in collaboration with the County Extension personnel at the study area. These additional funds were intended to develop outreach materials to the farmers and other stakeholders in support of strategies to mitigate the risk associated with this waterborne pathogen.