Human Health Risks From Contaminants in Reclaimed Juarez Wastewater

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Sheep grazing at experimental field plots amended with biosolids and irrigated with reclaimed wastewater, Juarez Valley, Mexico

BACKGROUND

The Paso del Norte region of the U.S. - Mexico border not only includes the major urban areas of El Paso and Ciudad Juarez with a combined population over 2 million, but also areas with intensive agriculture and livestock industries. Almost 90% of agriculture and livestock activities in the Juarez Valley of Mexico rely on the use of reclaimed wastewater. Juarez Valley reclaimed wastewater is a blend of raw and marginally treated (sedimentation) wastewater, and receives limited disinfection for the control of microbial pathogens. Pathogens, such as the parasites *Cryptosporidium* and *Giardia*, present in the reclaimed wastewater may be transmitted from humans to animals and ultimately back to humans. Residents of Juarez Valley communities may also be exposed to heavy metals in reclaimed wastewater, biosolids and locally produced meat products. Some heavy metals, such as chromium and lead, may have long-term adverse effects on agro-ecosystems, crop products and human health. For these reasons, there is a need to identify and quantify the existence of pathogens and heavy metal contaminants in irrigated and biosolid amended soils, and their movement into edible crops and animals to estimate the magnitude of risk to human health.

PROJECT OBJECTIVES

- Determine the presence of heavy metal pollutants and the microbial pathogens *Cryptosporidium* and *Giardia* in Juarez Valley reclaimed wastewater used for irrigation, lime stabilized biosolids, and soil.
- Assess metal and pathogen movement to oat forage and grazing sheep under field conditions in the Juarez Valley.

Aguas negras or "black water" wastewater canal, Juarez Valley, Mexico

FINDINGS AND BORDER IMPACTS

- The study found that the agricultural use of reclaimed wastewater and biosolids in the Juarez Valley, Mexico does not lead to increased levels of metals in oat forage or in sheep grazing on the forage. Therefore, consumption of locally produced meat products poses a low risk of exposure to heavy metal contaminants.
- High levels of the parasites *Giardia* and *Cryptosporidium* were found in the reclaimed water. Genetic fingerprinting determined that the types of *Giardia* found in sheep feces differed from those found in the reclaimed irrigation water. *Cryptosporidium* was not found in sheep feces, despite the presence of infectious *Cryptosporidium* in the irrigation water. While agricultural use of reclaimed water in the Juarez Valley does not appear to pose a risk to livestock, human contact with the reclaimed water poses a significant health risk and should be avoided.
- This international project between Mexican scientists, Texas AgriLife scientists and the Center for Border Health Research has fostered collaborative efforts to benefit the health of both U.S. and Mexican communities in the Paso del Norte region.

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