



USDA-CSREES 2007 National Water Quality Conference

Possible Effects of Arsenic in Drinking Water on Dairy and Beef Products

The USEPA's decision to lower the standard for arsenic in drinking water from 50 to 10 ppb has elevated public concern about potential health risks from naturally-occurring arsenic in ground water across the U.S. With funding from the Extension Great Lakes Regional Water Program we conducted an initial study (2004-2005) on dairy cattle from four farms with high arsenic concentrations in well water (>50 ppb). We identified that urine serves as a reliable biomarker of arsenic exposure in dairy cattle and that arsenic was not detected in bulk milk from the four farms. Additional funding from the U of MN's Agricultural Rapid Response program allowed us to further explore the effects of arsenic on dairy products and beef from dairy cattle exposed to arsenic in drinking water. Private well water was tested on 92 dairy farms in west central Minnesota and eighteen dairy farms were recruited to participate in the second phase of the study. The farms were divided into three groups: high, with arsenic concentrations >40 ppb in their water supply; medium, with arsenic between 10 and 40 ppb; and low, with arsenic levels <10 ppb. The U of MN St. Paul dairy herd, using a municipal water supply, served as a control. We sampled feed and mineral supplements, bulk milk, and urine from 6-8 cows from each farm. Milk from the high and low farms was processed into cheese. Meat samples and organ tissue was collected from cull cows. Organ issue was collected from bull calves that were fed milk replacer made from well water for three months. Arsenic was not detected in any bulk milk samples (detection limit 5 ppb), cheese, or whey. Urine serves as a good biomarker for arsenic exposure in cattle. Analysis of hamburger, steak, and organ tissues from cull cows and bull calves is in process. Results will be available by the time of the conference in January.

Author: Barbara Liukkonen

University Affiliation: University of Minnesota

Co-Author(s): Vince Crary, James Linn, Michael Murphy and Judith Kashman