Occurrence of Antibiotics in Liquid Waste at Confined Animal Feeding Operations and in Surface and Ground Water

Michael T. Meyer[1], J.E. Bumgarner[2], J.V. Daughtridge[3], Dana Kolpin[4], E.M. Thurman[5], and K.A Hostetler[6]

Radioimmunoassay and immunoassay tests were used to screen for five classes of antibiotics in liquid waste from confined animal feeding operations and in surface and ground water. Approximately one-half of the fifty million pounds of antibiotics produced annually in the United States is for agriculture, with the majority used as feed additives for growth promotion. One or more classes of antibiotics were detected in the liquid waste collected from eight hog lagoons. Tetracycline was the most frequently detected class of antibiotics followed by the sulfonamides, beta-lactams, and macrolides. Estimated concentrations of individual antibiotic screens of samples from the hog-lagoon samples ranged from less than 1 to more than 700 micrograms per liter (μg/L). In ground water, the tetracycline class of antibiotics was detected in a well sample collected near a hog lagoon, and the sulfonamide class was detected in another well sample near a different hog lagoon. The tetracycline class of antibiotics was tentatively detected in 1 of 13 surface-water samples at a concentration less than 1 μg/L. The presence of chlortetracycline in the liquid waste and the surface-water samples that responded positively to the tetracycline radioimmunoassay was confirmed on a subset of samples by using liquid chromatography/mass spectrometry with on-line, solid-phase extraction. The data from this study indicate that antibiotics are present in waste generated at confined animal feeding operations and may be available for transport into surface and ground water. These data indicate that methods with lower detection levels may be needed to study the occurrence of antibiotics in surface and ground water.

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[1]U.S. Geological Survey, 3916 Sunset Ridge Road, Raleigh, NC 27607 (mmeyer@usgs.gov)

[2]U.S. Environmental Protection Agency, MD-44, Research Triangle Park, NC 27711 (bumgarner.joseph@epa.gov)

[3]U.S. Environmental Protection Agency, MD-44, Research Triangle Park, NC 27711 (daughtridge.joel@epa.gov)

[4]U.S. Geological Survey, P.O. Box 1230, Iowa City, IA 52244 (dwkolpin@usgs.gov)

[5]U.S. Geological Survey, 4821 Quail Crest Place, Lawrence, KS 66049 (ethurman@usgs.gov)

[6]U.S. Geological Survey, 4821 Quail Crest Place, Lawrence, KS 66049 (khostet@usgs.gov)