

## Degradation Kinetics and Mechanism of Antibiotic Cefotiofur in Recycled Water Derived from a Beef Farm

Cefotiofur is used to treat respiratory diseases in cattle. It is typically injected into the muscle of cattle and is quickly metabolized to furoic acid and desfuroyicefotiofur (DFC), which has the same antibacterial properties as cefotiofur. Cefotiofur is either metabolized or excreted through urine and feces, and no trace of the drug is found in cattle one to two days after injection. Previous studies have shown that most of the cefotiofur is not metabolized and is excreted to manure. With liquid manure being recycled as fertilizer for crops, antibiotics entering the environment and increasing antibiotic resistance in bacteria or being absorbed into food crops is a concern.

ISTC's senior research scientist Wei Zheng collaborated with researchers from the Illinois State Water Survey, the U.S. Department of Agriculture, and the University of Illinois to determine the degradation kinetics of cefotiofur in liquid manure. Typically liquid manure is mixed with water to reduce the solids loading on the application system. The researchers mixed raw manure with water at concentrations from 1% to 5% manure. Then the mixtures were incubated at temperatures between 15 and 45°C. They found that cefotiofur hydrolysis and degradation increased with a higher manure concentration and incubation temperature. As a result of hydrolysis and biodegradation to DFC and cef-aldehyde (respectively), cefotiofur has less antibacterial activity, thereby reducing potential negative environmental impacts.

### Energy

### Pollutants

#### Aquatic Plastic Debris

#### Metals

#### Metalworking Fluids

#### Per- and Polyfluoroalkyl Substances (PFASs)

#### Agricultural Chemicals

#### PPCPs in the Environment

#### Pilot Study on PPCPs at Champaign and Urbana Wastewater Treatment Plants (WWTPs)

#### PPCPs: Extending Knowledge and Mitigation Strategies

#### Fate and Transport of Steroid Hormones and Veterinary Antibiotics Derived from Cattle Farms

#### Uptake, Translocation, and Accumulation of Pharmaceutical and Hormone Contaminants in Vegetables

#### Fate of Pharmaceutical and Personal Care Products in Irrigated Wastewater Effluent

#### Karst Groundwater Contaminants in Western Illinois

#### PPCPs in Karst Groundwater in Southwestern Illinois

#### Triclosan in Illinois Rivers and Streams

#### Tunable Luminescent Carbon Nanospheres with Well-Defined Nanoscale Chemistry for Synchronized Imaging and Therapy

#### Occurrence and Removal of Pharmaceutical and Hormone Contaminants in Rural Wastewater Treatment Lagoons

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#### Anaerobic Transformation Kinetics and Mechanism of Steroid Estrogenic Hormones in Dairy Lagoon Water

#### Nano-CarboScavengers

#### Medicine Collection Boxes

#### 2008 PPCPs Symposium

**2016 PPCPs in the Environment Conference**

**2017 Emerging Contaminants in the Aquatic Environment Conference**

**2018 Emerging Contaminants in the Aquatic Environment Conference**

**2019 Emerging Contaminants in the Environment Conference**

**2016 Teacher Workshop on Pharmaceutical and Personal Care Products in the Environment**

**PPCPs Videos**

**Emerging Contaminants Consortium**

**PCBs & PBDEs**

**Polycyclic Aromatic Hydrocarbons (PAHs)**

**Waste Utilization**

**Water**

**Instruments & Equipment**

**Hazardous Waste Research Fund**

### **Meet the Scientists**

**Wei Zheng**

### **Publications**

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One Hazelwood Drive, MC-676  
Champaign, IL 61820  
p: 217-333-8940  
**Email us**

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