



Environmental Fate and Effects of Pollutants

Professors Daniel Fisher and Lance Yonkos have been studying the environmental fate and effects of reproductive steroids and antibiotics found in poultry litter and biosolids used as fertilizer for crops on the Delmarva Peninsula of Maryland. They have also been studying the effects of different tillage practices on surface runoff from these amended fields.

What Are Poultry Litter and Biosolids?

Poultry litter is the mixture of excrement and bedding material from the houses in which chickens are grown. Biosolids are the solid material left over after human waste has been treated in a sewage treatment plant. Both materials are widely used on agricultural fields as fertilizer on the Delmarva Peninsula, especially for corn. For example, over 600 million chickens and 730,000 metric wet tons of litter are produced annually in this area. Most of this litter is used as organic fertilizer.

Environmental/Human Health Issues

Reproductive steroids like estradiol and testosterone are produced naturally by chickens and not administered for growth promotion. They build up in poultry litter after thousands of chickens are grown in individual houses, are known to persist for multiple years and can reach surface waters in field runoff. In laboratory studies with fish Drs. Fisher and Yonkos have shown that reproductive steroids in poultry litter can cause endocrine disruptive effects. These include the development of abnormal reproductive tissues in male fish, skewed gender distribution of fish towards females, and the presence of female-specific egg-yolk proteins in male fish. In addition, the researchers have found intersex in largemouth bass field collected on the Delmarva Peninsula – male fish with immature eggs in their gonads. Literature dealing with intersex in male fish has postulated a link to poultry litter.

Antibiotics are used in the poultry industry for therapeutic disease prevention and treatment and to stimulate growth promotion. Human-use antibiotics are found in biosolids because normal sewage treatment processes do not remove these contaminants. The researchers have found numerous antibiotics in both poultry litter and biosolids, in the soils of fields treated with these contaminants, and in runoff from the treated fields. They have also found bacteria resistant to human use antibiotics in the soils of these treated fields. Antibiotic resistance is a growing concern worldwide.

Research Benefits

- Increase our understanding of the environmental and human health consequences of runoff of reproductive steroids and antibiotics from poultry litter and biosolids amended fields.
- Develop and test tillage and field management practices that control the runoff of contaminants from agricultural fields.