



**Title:** Fate and Transport of Sex Hormones from Poultry Litter Applied to Till and No\_Till Cropping Systems

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**Theme:** Animal Waste Management

**Situation:** The U.S. poultry industry produces millions of tons litter annually. Most of it is applied to agricultural fields as a source of fertilizer. It is also a source of the sex hormones estradiol and testosterone, both of which have been detected in surface waters. The question arises whether the application of poultry litter to agricultural fields is a threat to contaminate our water resources with these sex hormones.

**Objectives:** Determine if the concentrations of estradiol and testosterone in runoff and drainage from conventional-till and no-till crops receiving broiler litter are significantly greater than in runoff and drainage from control plots receiving mineral fertilizer. Characterize subsurface transport of estradiol and testosterone.

**Methods:** Six no-till and six tilled plots in a random block design received agronomic levels of litter or mineral N, P, K before planting. Litter was assayed for hormones to determine load. After rye (in fall) and corn (in spring) were planted, run off and drainage was generated by rain or irrigation. Drainage and runoff was measured and subsampled. Water and litter subsamples were extracted with ethylacetate, and the residue analyzed for the hormones by competitive enzyme immunoassay. With intact soil columns subsurface transport of radio labeled estradiol and testosterone was characterized.

**Partnerships:** Scientists and a graduate student from the University of Georgia collaborated on this project.

**Research:** Preliminary data from this project have been presented at an annual meeting, and manuscripts will be produced for refereed journals.

**Resources:** My and my technician's time and the time of the other principal investigators were cost-free.

**Results:** Concentrations of sex hormones in drainage and runoff from litter-amended plots were not significantly different from plots amended with mineral fertilizer. Soil concentrations of the hormones decreased weeks after litter application and the rain or irrigation events. Batch isotherm and intact column experiments indicated that while retardation coefficients for both hormones were high, movement of the hormones occurs when preferential flow through soil exists. Preliminary results from a tissue culture assay indicated that estradiol concentrations in drainage were bioactive.



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