

## **OVERVIEW OF MANURE HANDLING ON STEROID MOVEMENT IN AGRICULTURAL FIELDS FROM BEEF CATTLE SYSTEMS**

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### **Abstract**

Manure generated from concentrated animal feeding operations may serve as a source of steroids in surface water and potentially in groundwater. The objectives of this research were to determine the amount of steroids and metabolites in runoff from beef cattle production pens, and from runoff and leaching from crop production fields. Cattle were fed a synthetic progestagen, MGA or melengestrol acetate and treated with zeranol, trenbolone acetate, and estradiol implants, while a second group was not treated with growth promoters. Manure was sampled in the pens during feeding, run-off was collected during rainfall events, after feeding manure was collected and either composted or stockpiled overwinter. The following summer both composted and stockpiled manure was spread on a field, with plots subjected to different tillage practices. Following application, two rainfall simulation events were conducted: one day (1 DAT) and one month later (30 DAT) to determine the effects of rainfall timing, manure handling (treated compost, untreated compost, treated stockpile and untreated stockpile) and tillage (no-till, moldboard plow+disk and disk) on the runoff losses of steroids. Results from the manure composting showed reduction in steroid concentrations over stockpiling for some compounds such as 4-androstenedione,  $\beta$ -zearalenol, and progesterone; though not for all steroids. Very low concentrations of steroids were found in most runoff samples, approaching or below detection limits. Considering only detection frequency, fewer runoff samples showed traces of steroids on the 1 DAT in comparison to the 30 DAT simulations. The amount of antecedent rainfall before runoff was affected by tillage, and was different for the 1 DAT and 30 DAT events. A second year's study with a smaller set of treatments, and use of a surrogate estrogen applied at known mass showed that plowing significantly reduced runoff losses of steroids.

### **Introduction**

This research project was quite comprehensive and contained studies designed to determine loss of growth promoting compounds at various points in the path from animal excretion to land application. Several journal articles have already been published on the details and findings. They are listed in the Reference section.

### **Acknowledgement**

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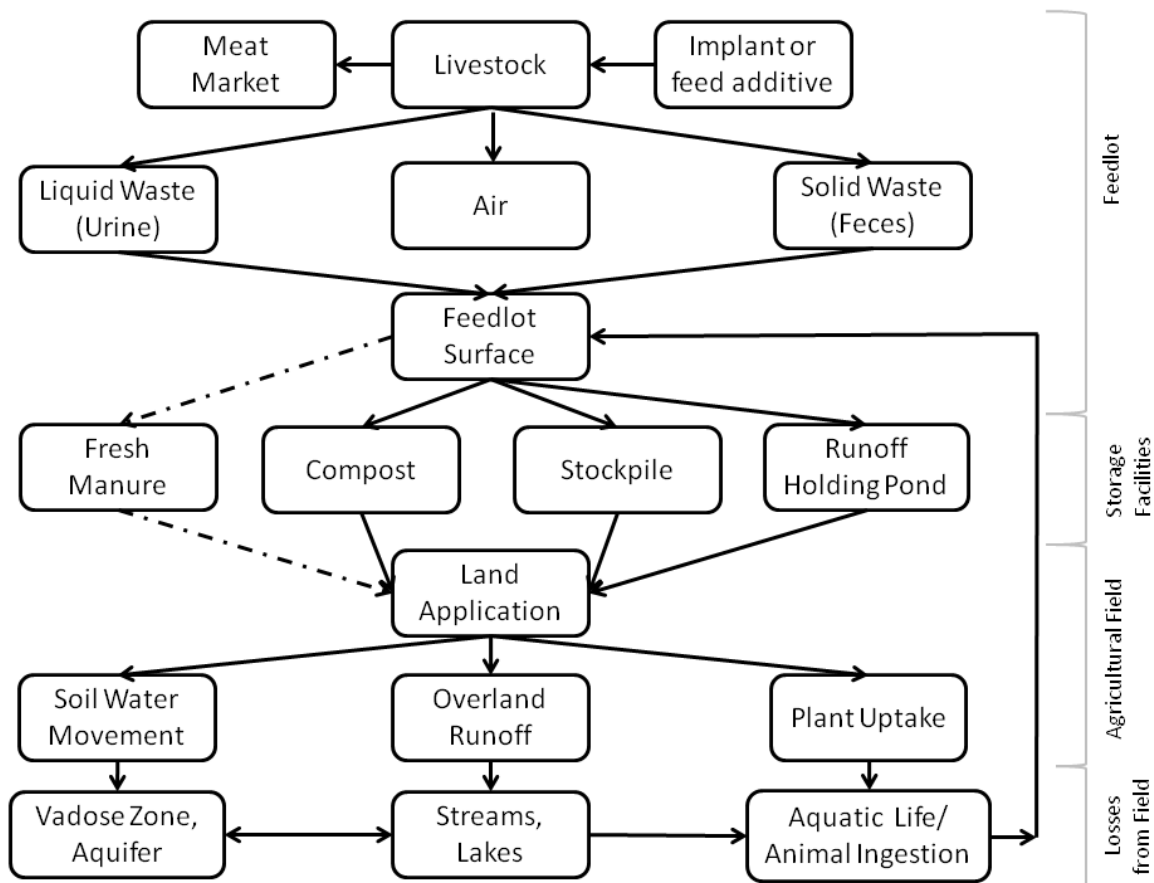


Figure 1: Pathways of steroid hormones in the environment after cattle implant and/or feed additive

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