FIELD DAY REPORT - 1993

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WATER QUALITY RESPONSES TO LAND APPLICATION OF LIVESTOCK WASTE

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Background. Dairy effluent and poultry litter are commonly applied to pasture grasses in various areas of East Texas. An increase in the number of poultry houses and dairy herds on small land areas has contributed to concerns that high rates of waste application may result in loss of nutrients into surface water and groundwater. The Federal Environmental Protection Agency, Texas Water Commission, and other regulatory agencies have responded by increasing their monitoring of waste disposal practices.

Monitoring and enforcement activities of regulatory agencies have highlighted the need for additional research into the movement of manure nutrients, primarily nitrate (NO_3^-), through the soil profile. Information is needed to determine environmentally safe levels of waste application to forages. This is particularly critical where high soil temperatures, high rainfall, and coarse textured soils (sands) combine to increase the likelihood of nutrients leaching into groundwater.

The objectives of this research are:

1. To monitor the movement of nitrogen (N), phosphorus (P), and potassium (K) under a bermudagrass/ryegrass stand which receives various rates of dairy effluent and poultry litter.
2. To investigate the concentration of N, P, and K in soil water both within and below the root zone of bermudagrass/ryegrass receiving livestock waste applications.

Current Information. A study concerning the water quality impacts of animal waste application was initiated in the spring of 1992. An established stand of 'Coastal' bermudagrass was selected as the test site. The area was divided into 32 10x15 ft plots which were grouped to receive poultry litter or dairy effluent applications at rates of 0, 225, 450, or 895 lb N/ac per year from animal waste. Half of the plots were equipped with porous-cup lysimeters which are devices to extract moisture directly from the soil profile. In the autumn, plots were overseeded with 'TAM 90' annual ryegrass.

Data to be collected include soil, water, and forage samples for each applicable plot. Chemical analysis will be conducted to determine the nutrient content of soil, forage, and water samples. When completed, these data should provide a detailed quantification of the movement

of nutrients from animal manure through a sandy, East Texas soil.

Recommendation. While the data collected thus far will support no recommendations, it is evident that some limit must exist beyond which increasing rates of livestock waste application may lead to environmental degradation. Current Texas Water Commission recommendations discourage animal waste applications exceeding 200 lbs of nitrogen/acre/year. This general guideline does, however, recognize that different cropping practices have widely varying nutrient use potentials. Providing information on the nutrient use of the widely-used bermudagrass/ryegrass forage system should help producers in their ongoing environmental stewardship efforts. Forages in general, and bermudagrass specifically, are plants that serve as "filter systems" to capture and use nutrients from fertilizers or animal waste. In addition to their efficient conversion of these nutrients into dry matter production, these forages also play a critical role in reducing soil erosion.