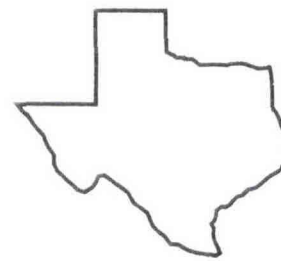
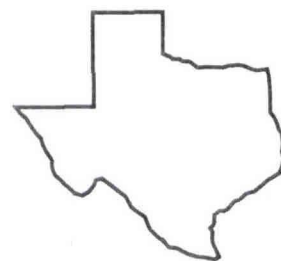
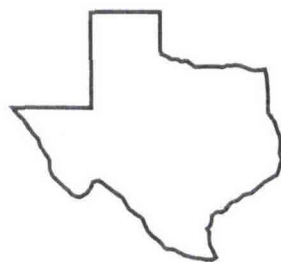
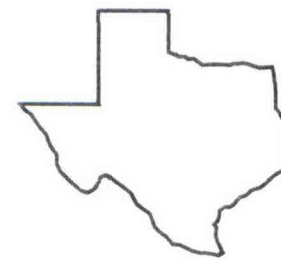




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## WATER QUALITY RESPONSES TO LAND APPLICATION OF POULTRY LITTER AND DAIRY EFFLUENT

A. F. Johnson, F. M. Rouquette, Jr., V. A. Haby, and D. M. Vietor

**Background.** Dairy effluent and poultry litter are commonly applied to pastures 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 manure application may result in nitrate leaching beyond the root zone of the recipient crop. In East Texas, the recipient crop will likely be a perennial grass (e.g. 'Coastal' bermudagrass) overseeded with a winter annual (e.g. annual ryegrass). The nutrient requirements of perennial and annual grasses have been estimated under controlled application of fertilizers. However, nutrient concentrations in manure and recovery by grasses receiving waste applications have not been evaluated on deep sandy, soils of East Texas. Information is needed to define an environmentally safe level of waste application to forages grown in the sandy soils of the humid South.

**Research Findings.** A study concerning impacts of animal waste on water quality 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 850 lb N/ac per year. Half of the plots were equipped with porous-cup lysimeters to allow for the extraction of moisture directly from the soil profile. In the autumn, plots were overseeded with 'TAM 90' annual ryegrass.

Soil water samples were collected from 6-ft depths following large rainfall events and were analyzed for  $\text{NO}_3\text{-N}$  (Tables 1 and 2). Preliminary data indicated that water samples from the 0, 225, or 450 lb/ac nitrogen rates did not exceed the U.S. EPA drinking water standard of 10 mg/L  $\text{NO}_3\text{-N}$ . However, the mean  $\text{NO}_3\text{-N}$  content of leachates from the 850 lb/ac nitrogen rate was 17.5 mg/L for poultry litter and 11.5 mg/L for dairy effluent plots. Both these levels of  $\text{NO}_3\text{-N}$  exceed EPA drinking water standards and indicated leaching of nitrate from the root zone.

**Application.** These preliminary findings indicated that split applications of either poultry litter or dairy effluent to Coastal bermudagrass/ryegrass pasture are not likely to lead to groundwater contamination when nitrogen rates do not exceed 450 lbs/ac per year. This conclusion further argues the importance of accurate testing for nutrients in animal waste to allow informed, environmentally beneficial utilization that will not exceed the amounts that plants can use.

Table 1. Preliminary soil-water nitrate concentration. Poultry litter. 1992-93.

| Nitrogen rate<br>lbs/ac | Mean*  | Soil-water Leachate               |            |
|-------------------------|--------|-----------------------------------|------------|
|                         |        | Max. Obs.<br>Value                | Std. Error |
|                         |        | -----mg/L NO <sub>3</sub> -N----- |            |
| 0                       | 1.2 a  | 2.7                               | 0.33       |
| 225                     | 1.4 a  | 3.2                               | 0.50       |
| 450                     | 1.7 a  | 2.5                               | 0.32       |
| 850                     | 17.5 b | 24.4                              | 2.65       |

\*Means followed by the same letter within columns are not significantly different (p<.05).

Table 2. Preliminary soil-water nitrate concentration. Dairy effluent. 1992-93.

| Nitrogen rate<br>lb/ac | Mean*  | Soil-water Leachate               |            |
|------------------------|--------|-----------------------------------|------------|
|                        |        | Max. Obs.<br>Value                | Std. Error |
|                        |        | -----mg/L NO <sub>3</sub> -N----- |            |
| 0                      | 3.8 a  | 8.4                               | 0.77       |
| 225                    | 3.6 a  | 6.9                               | 0.62       |
| 450                    | 1.3 a  | 2.4                               | 0.24       |
| 850                    | 11.5 b | 33.4                              | 3.23       |

\*Means followed by the same letter within columns are not significantly different (p<.05).