

Swine Manure Management Study

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Introduction

Manure can be a valuable resource if applied properly to utilize its nutrient content. To better define the value of manure, a multiyear research project was begun in 1998 at the Southeast Research Farm to study the fertilizer rate of effect and the best method of manure application in corn-soybean rotation. In 1997, the land where this trial is being conducted was in winter wheat. In 1998, the corn-soybean rotation was being established. And 1999 was the first year that the full rotation and manure treatments were in place.

Methods

The research trial consists of seven treatments replicated three times; manure is applied on five of the treatments (Table 1). Each year in November, application is made of manure obtained from local producers. Samples of the manure are taken during application to each plot. While nutrient content varies from year to year (Table 4), testing has shown nutrient content for any given year to be uniform. The commercial fertilizer ammonium nitrate is applied at 150 lb N/acre immediately prior to planting. Normal weed and insect control practices are used.

Results and Discussion

There has been statistically significant corn yield response (40–70 bushels/acre) for all of the treatments over the check treatment (tables 1,2,3). Also, application of additional 50 lb N/acre to the surface applied manure resulted in an 8–15

bushels/acre response. In most cases, yield differences between the remaining treatments was insignificant.

On manured ground, a soil nitrate test of 20–25 ppm should provide adequate nitrogen for one corn crop. The check treatment has always indicated an N deficiency, and by itself, surface applied manure often was marginal on this test. An end-of-season stalk test of 200–700 ppm usually is considered marginal, and 700–2000 ppm is adequate, with more than 2000 ppm being excessive. In most cases, it appears that only the check treatment and the surface applied manure treatment resulted in low nitrogen at the end of the growing season. It also appears that the 8000 gal/acre rate does not increase yields but always appears to be excessive on end-of-season stalk test results.

On the soybean plots, only treatment 5 received any manure or fertilizer for the soybean growing season (tables 1, 2, and 3). With treatment 5, there was a trend towards higher yield; but only in 2001 was the yield significantly higher than in treatments other than the check.

The plots are being expanded in 2002, with a lower manure rate and several N-serve treatments.

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Table 1. 1999 Manure management study results.

| Trt. | Corn | Soybeans | Late spring N test ppm | Stalk test ppm | Corn bu/acre | Soybean bu/acre | |
|------|--------------------------|------------------|------------------------|----------------|--------------|-----------------|----|
| 1 | Check | | 12 | 49 | 137 | 47.7 | |
| 2 | 4000 gal. surface | | 20 | 65 | 177 | 49.0 | |
| 3 | 4000 gal. surface + 50 N | | 25 | 1288 | 185 | 49.3 | |
| 4 | 4000 gal. injected | | 25 | 2613 | 186 | 50.3 | |
| 5 | 4000 gal. injected | 4000 gal. inject | 41 | 2749 | 193 | 52.3 | |
| 6 | 8000 gal. injected | | 33 | 6863 | 182 | 50.1 | |
| 7 | 150 lb commercial N | | 37 | 2636 | 185 | 50.4 | |
| | | | | | LSD P=.05 | 5 | NS |

Table 2. 2000 Manure management study results.

| Trt. | Corn | Soybeans | Late spring N test ppm | Stalk test ppm | Corn bu/acre | Soybean bu/acre | |
|------|--------------------------|------------------|------------------------|----------------|--------------|-----------------|------------------|
| 1 | Check | | 10 | 21 | 126 | 41.8 | |
| 2 | 4000 gal. surface | | 18 | 46 | 164 | 44.4 | |
| 3 | 4000 gal. surface + 50 N | | 26 | 1230 | 179 | 44.3 | |
| 4 | 4000 gal. injected | | 22 | 442 | 179 | 45.5 | |
| 5 | 4000 gal. injected | 4000 gal. inject | 26 | 1670 | 170 | 46.1 | |
| 6 | 8000 gal. injected | | 24 | 3950 | 172 | 47.7 | |
| 7 | 150 lb commercial N | | 35 | 1080 | 171 | 44.4 | |
| | | | | | LSD P=.05 | 9 | LSD P=.05 2.6 |

Table 3. 2001 Manure management study results.

| Trt. | Corn | Soybeans | Late spring N test ppm | Stalk test ppm | Corn bu/acre | Soybean bu/acre | |
|------|--------------------------|------------------|------------------------|----------------|--------------|-----------------|------------------|
| 1 | Check | | 11 | 22 | 129 | 36.5 | |
| 2 | 4000 gal. surface | | 21 | 27 | 187 | 41.4 | |
| 3 | 4000 gal. surface + 50 N | | 26 | 259 | 199 | 41.5 | |
| 4 | 4000 gal. injected | | 37 | 552 | 201 | 42.3 | |
| 5 | 4000 gal. injected | 4000 gal. inject | 24 | 1005 | 204 | 45.9 | |
| 6 | 8000 gal. injected | | 42 | 2075 | 196 | 44.1 | |
| 7 | 150 lb commercial N | | 24 | 350 | 194 | 41.1 | |
| | | | | | LSD P=.05 | 9 | LSD P=.05 2.8 |

Table 4. Manure Test Results

| Sampling date | Total N lb/1000 gal | NH ₃ N lb/1000 gal | P ₂ O ₅ lb/1000 gal | K ₂ O lb/1000 gal | % Solids |
|---------------|---------------------|-------------------------------|-------------------------------------------|------------------------------|----------|
| 11/13/97 | 39 | 30 | 27 | 28 | 3.0 |
| 11/25/98 | 50 | 38 | 61 | 27 | 8.1 |
| 11/17/99 | 52 | 35 | 57 | 30 | 5.8 |
| 11/2/00 | 68 | 60 | 35 | 40 | 6.1 |