Nitrogen Carryover from Swine Manure

A.S. Leaflet R2042

Greg Brenneman, Extension Ag Engineer
Kevin Van Dee, Farm Superintendent

Summary and Implications

Swine manure or commercial fertilizer had been fall applied for the prior year(s) crop. Late spring soil nitrate tests and crop yield for the current year were collected to determine the value of nitrogen carryover.

Introduction

Swine manure is readily available in Iowa and is an excellent source of fertilizer for crops. Application rates are often based on the nitrogen (N) needs of the coming year's crop. Producers often ask how much N is available the first year and if any N carries over to subsequent years. ISU publication, PM-1811, recommends that 98% of the nitrogen from liquid swine manure is available for the current growing year.

Materials and Methods

Plots previously in a corn-soybean rotation were identified at the Southeast Research and Demonstration Farm (SERF) where manure had been applied over the past five years. On all plots (except 4000I-yearly where manure was applied every year), manure or fertilizer had only been applied ahead of the corn crop. Plots were split with anhydrous ammonia nitrogen applied to one-half of each plot in the fall of 2003. Nitrogen was applied at 150 lbs/acre following soybeans and 200 lbs/acre following corn. Corn was planted on all plots in 2004. Late spring nitrate tests (LSNT) and crop yields were collected on all plots.

Results and Discussion

The results of the LSNT and crop yield are summarized in Table 1. The application of commercial nitrogen fertilizer increased N levels and yield in all plots.

For the corn after soybeans, where no N was applied for 2004, all LSNT results were similar but deficient (less than 20 ppm). Two treatments, 8000I and 4000I-yearly, showed increased yields over the other treatments. This is likely due to unused N built up in the soil where more total N had been applied in the previous 5 year studies.

For corn after corn plots where no N was applied for 2004, LSNT levels were lower (9 ppm) than for the corn after soybeans plots (11 ppm). Yield levels for the check treatment where no N has been applied for 5 years was also much lower in corn after corn (38 bu/acre) than for the corn after soybeans (121 bu/acre).

Because of different N levels in the manure that was applied for the 2003 crop, manure N levels varied from 40 to 245 lb/A. While there did appear to be an increase in yields with some previous manure applications, this appeared to be a function of more total N having been applied in past years.

It is interesting to note that for both corn after soybeans and corn after corn, the previous treatments of Commercial N and 4000 gal/acre Injected (both done only ahead of corn) had similar yield levels in 2004 for the same previous crop and N application.

When comparing treatments with no additional N applied for 2004, the yields appear to show more carryover of N where N-Serve® was used for 2003.

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Table 1. 2004 SERF Manure Nitrogen Carryover Plots

Previous Treatment	N applied for 2003	N applied for 2004	LSNT ppm	2004 Corn Yield bu/acre
Corn after Soybeans				
CHECK			11	121
2000I			10	128
2000I+Nserve			12	121
4000I			11	143
4000I+Nserve			10	132
Commercial N			9	145
8000I			13	178
4000I-yearly	245		10	201
CHECK		150	28	183
2000I		150	23	177
2000I+Nserve		150	26	181
4000I		150	25	211
4000I+Nserve		150	28	195
Commercial N		150	22	205
8000I		150	25	209
4000I-yearly	245	150	24	229
Corn after Corn				
CHECK	0		6	38
2000I	40		7	66
4000I	75		9	74
2000I+Nserve	120		9	117
Commercial N	150		7	74
8000I	150		9	128
4000I-yearly	245		9	162
4000I+Nserve	245		9	180
CHECK	0	200	22	172
2000I	40	200	25	175
4000I	75	200	22	192
2000I+Nserve	120	200	16	189
Commercial N	150	200	22	194
8000I	150	200	26	207
4000I-yearly	245	200	25	218
4000I+Nserve	245	200	18	218