

Comparison of Incorporated and Surface Applied Swine Manure and Anhydrous Ammonia as Nitrogen Sources at Side-dress for Corn Yield

Glen Arnold, Ohio State University Extension Educator, Putnam County
Albert Maag, Putnam County Soil and Water Conservation District

Objective

To compare corn yield response to nitrogen applied at side-dress as incorporated swine finishing manure, surface applied swine finishing manure, and anhydrous ammonia

Background

Crop Year:	2011	Tillage:	Conventional
Location:	Shawtown, OH	Soil Test	pH 6.3, P 60 ppm, K 210 ppm, OM 2.2%
County:	Hancock	Planting Date:	June 4, 2011
Soil Type:	Hoytville clay	Row Width:	30 inches
Drainage:	Tile – 40 ft spacing	Harvest Date:	October 15, 2011
Previous Crop:	Soybeans		
Hybrid:	Pioneer 33W84		

Methods

A randomized block design with three treatments and four replications was used. Plots were 12 rows (30 feet) wide and 2,200 feet long. Liquid swine manure from a finishing building was applied via incorporation using a 5,250 gallon Balzer tanker equipped with a Detrick toolbar. The surface treatments were also applied in the same fashion by raising the toolbar. The farmer pulled an anhydrous ammonia toolbar through the surface applied manure treatments several hours after manure was applied in an effort to provide a level of tillage similar to the other two treatments.

The swine manure and anhydrous ammonia were applied on the same day while the corn was in the three leaf stage. Field conditions were firm at the time of application.

The anhydrous ammonia application rate was 180 units of nitrogen per acre. All swine manure replications received 6,000 gallons per acre. Manure samples indicated 32.1 pounds of available nitrogen per 1,000 gallons. Swine manure treatments received 193 pounds of nitrogen, 84.6 lb./ac P₂O₅ and 165 lb./ac K₂O.

Table 1 Swine Finishing Manure Analysis

Nutrient	lbs. per 1,000 Gallons
Nitrogen (available the 1 st year)	32.1
Phosphorus as P ₂ O ₅	14.1
Potassium as K ₂ O	27.5

Weather conditions during the time of manure application were sunny with an ambient air temperature of 75 degrees. The plot received well above normal rainfall for the growing season.

Table 2 Treatment Summary

Treatment	Description
Treatment 1 (T1)	180 #/ac anhydrous ammonia
Treatment 2 (T2)	6,000 gal/ac surface applied liquid swine manure
Treatment 3 (T3)	6,000 gal/ac incorporated liquid swine manure

Results

Table 3 Yield Summary

Treatments	Yield (bu/ac)
Average of four anhydrous reps (T1)	183.2 _a
Average of four surface manure reps (T2)	171.0 _c
Average of four incorporated manure reps (T3)	176.8 _b

The results of this plot indicate that each of the treatments were statistically significant in yield difference (LSD (0.05) = 4.79).

Summary

The anhydrous ammonia cost \$0.62 per pound or \$112 per acre plus the cost of application. The manure was available from the farmer's swine finisher building at no cost. The manure application cost, using the Minnesota Manure Distribution Cost Analyzer spreadsheet was calculated at \$20 per 1,000 gallons or \$.02 per gallon. The cost of applying 6,000 gallons per acre as sidedress nitrogen was \$120 per acre.

Acknowledgement

The authors would like to thank Jeff Duling for the use of his manure application equipment. The authors would also like to thank Roger and Lori Rader the use of their field and swine manure. The authors would also like to thank the Ohio Pork Producers and Ag Credit for their financial support of this research.

For more information, contact:
Glen Arnold
Ohio State University Extension, Putnam County
124 Putnam Parkway
Ottawa, OH 45875
arnold.2@osu.edu

