Comparison of Fall Applied Swine Manure and Anhydrous Ammonia as Nitrogen Sources for Corn Yield

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Objective

To compare corn yield response to fall applied nitrogen as swine finishing manure and variable rates of side-dress incorporated anhydrous ammonia.

Background

Crop Year:	2014	Soil Test	pH 6.4
Cooperator:	Jeff Kreinbrink		P 46 ppm (84 lb/ac)
County:	Hancock		K 170 ppm (340 lb/ac)
Nearest Town:	Gilboa		Organic Mater 2.7%
Drainage:	Tile-40 feet spacing	Planting Date:	May 11, 2014
Soil type:	Hoytville Clay	Row Width:	30 inch
Tillage:	Conventional	Herbicide:	FulTime NXT 3 qt/ac
Previous Crop:	Soybeans	Insecticide:	N/A
Variety:	Pioneer 33W84	Harvest Date:	October 15, 2014

Methods

A randomized block design with three treatments and four replications was used. Plots were 16 rows (40 feet) wide and 1,100 feet long. Liquid swine manure from a finishing building was fall applied via incorporation using a manure tanker and Gentil toolbar. The Gentil tool tilled the soil and the manure was sprayed onto the tilled soil. Two of the three treatments received 7,000 gallons per acre which totaled 349 pounds per acre of available nitrogen.

The swine manure was applied on October 20th when the average daily temperatures were about 43 degrees. The winter resulted in cold, frozen soil conditions and cooler than normal spring temperatures. A pre-plant soil health test submitted through Brookside Labs indicated 109 #/acre of available nitrogen in the fall applied manure treatments.

The field was planted in early May. In early June the treatment not receiving a fall application of manure was sidedressed with 4,500 gallons of swine finishing manure per acre using a manure tanker and Dietrich toolbar. The fall manure treatments were sidedressed with 65# and 165# of nitrogen as anhydrous ammonia respectively.

Table 1. Swine Finishing Manure Analysis

Nutrient	lbs. per 1,000 Gallons
Nitrogen (available the 1st year)	49.8
Phosphorus as P_2O_5	24.1
Potassium as K_2O	38.2

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

Table 2. Treatment Summary

Treatment	Description
Treatment 1 (T1)	7,000 gallons per acre fall applied swine manure + 65#/acre of sidedress anhydrous ammonia
Treatment 2 (T2)	7,000 gallons per acre fall applied swine manure + 165# acre of sidedress anhydrous ammonia
Treatment 3 (T3)	4,500 gallons per acre of sidedress swine finishing manure 225#N/acre

Results and Discussion

Table 3. Yield Summary

Treatments	Yield (bu/ac)
(T1) Fall applied swine manure + 65#N /acre of anhydrous ammonia	172.7_b
(T2) Fall applied swine manure + 165#N /acre of anhydrous ammonia	217.1_a
(T3) Incorporated swine finishing manure 225#/N acre	214.8_a
	LSD (0.05)

The results of this plot indicated a statistically significant difference between the treatments (LSD (0.05) = 9.07, C.V=2.60). The plot did not appear to have retained as much of the nitrogen from the fall applied swine manure as we had expected. The plot could have lost nitrogen with the wet spring which delayed spring planting or the test showing the nitrogen available for the corn crop growing season could have been incorrect. The cooler than normal growing season could have resulted in less mineralization of the organic matter in the field.

The anhydrous ammonia cost was $0.52 per pound plus the cost of application. Based on the OSU Extension 2014 Ohio Farm Custom Rate Survey, the cost of applying the anhydrous ammonia is approximately $12.90 per acre.

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 for both the fall applied and early summer sidedress manure.

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