Comparison of Dairy Manure to 28% UAN as a Spring Top-Dress Nitrogen Source on Wheat Yield

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Objective

To compare soft red winter wheat yield response to nitrogen applied at spring top-dress as dairy manure and as 28% UAN

Background

Crop Year:	2011	Variety:	Pioneer 25R47
Location:	Glandorf, OH	Tillage:	No-till
County:	Putnam	Soil Test	pH 6.4, P 105 ppm, K 142 ppm, OM 2.6%
Soil Type:	Paulding Clay		
Drainage:	None	Planting Date:	October 8, 2010
Previous Crop:	Soybeans	Harvest Date:	July 5, 2011

Methods

A randomized block design with two treatments and four replications was used. Manure plots were 26 feet wide and 28%UAN plots were 90 feet wide. All plots were 1,000 feet long. Liquid dairy manure from an outside dairy storage pond was surface applied using a 6,400 gallon tanker on April 10th. The 28%UAN was applied the same day.

Urea application rate was 100 pounds of nitrogen per acre. The liquid dairy manure application rate was 12,000 gallons per acre. The rate of manure was chosen to approximately match the ammonia nitrogen content of the dairy manure with the nitrogen amount in the urea fertilizer. The organic portion of the dairy manure did not appear to mineralize in time to supply nitrogen to the wheat crop based on past wheat plots. Thus, the decision was made to increase the rate of manure applied.

Manure sample results indicated 8.1 pounds of ammonia-nitrogen and 14.9 pounds of organic nitrogen per 1,000 gallons of dairy manure. The 12,000 gal/ac dairy manure treatments received 97 pounds of ammonia nitrogen, 179 pounds of organic nitrogen, 104 lbs./ac P_2O_5 and 255 lbs./ac K_2O.

Table 1 Dairy Manure Analysis

Nutrient	lbs per 1,000 Gallons
Ammonia-Nitrogen	8.1
Organic Nitrogen	14.9
Plant available N	12.9
Phosphorus as P_2O_5	8.7
Potassium as K_2O	21.3

Weather conditions during the time of manure application were overcast and 65 degrees. Field conditions were reasonably firm and the manure application equipment did not leave ruts in the field. The plot received almost 16 inches of rainfall in the two months following the top-dress applications resulting in much lower yields than normal. The organic material in the manure likely helped keep the manure treatments wetter than the commercial fertilizer treatments. Yields were negatively impacted by Fusarium Head Scab and Stagonospora nodorum Blotch across all treatments.

Table 2 Treatment Summary

Treatment	Description
Treatment 1 (T1)	100 lbs. nitrogen per acre as 28% UAN
Treatment 2 (T2)	155 lbs. of plant available N as 9,000 gal/ac dairy manure

Results

Table 3 Yield Summary

Treatment	Yield (bu/ac)
Treatment 1 (T1)	55.3
Treatment 2 (T2)	46.6

The results of this plot did indicate a significant statistical difference for yield between the 28% UAN treatment and the dairy manure treatment (LSD (0.05) =0.96).

Summary

The organic portion of the nitrogen in the dairy manure does not appear to become available for the wheat crop in time to produce yields statistically similar to commercial fertilizer. Farmers utilizing dairy manure as a spring fertilizer source for wheat should plan to utilize the excess phosphorus and potassium applied in the following crop rotation.

Urea cost was $0.65 per pound. Urea replications had $65 per acre in fertilizer expense plus the cost of application. The manure was available from the farmer's manure storage pond 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 12,000 gallons per acre as sidedress nitrogen was $240 per acre.

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