Comparison of Dairy Manure to Urea 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 urea

Background

Crop Year:	2011	Variety:	AgriPro W114
Location:	Glandorf, OH	Tillage:	Conservation tillage
County	Putnam	Soil Test	pH 6.4, P 105 ppm, K 142
Soil Type:	Del Rey Silt Loam		ppm, OM 2.6%
Drainage:	None	Planting Date:	September 28, 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 urea plots were 40 feet wide. All plots were 600 feet long. Liquid dairy manure from an outside dairy storage pond was surface applied using a 6,400 gallon tanker on April 10th. Urea was applied using a standard fertilizer buggy on the same day.

Urea application rate was 95 pounds of nitrogen per acre. The liquid dairy manure application rate was 9,000 gallons per acre.

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 9,000 gal/ac dairy manure treatments received 116 pounds of available N (73 pounds in the ammonia form), 78 lbs./ac P_2O_5 and 192 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 wet and the manure application equipment left ruts in the field. The plot received almost 15 inches of rainfall in the two months following the top-dress applications

resulting in much lower yields than normal. Yields were negatively impacted by *Fusarium* Head Scab and *Stagonospora nodorum* Blotch across all treatments.

Table 2 Treatment Summary

Treatment	Description
Treatment 1 (T1)	95 lbs. nitrogen per acre as urea
Treatment 2 (T2)	116 lbs. of plant available N as 9,000 gal/ac dairy manure

Results

Table 3 Yield Summary

Treatment	Yield (bu/ac)
Treatment 1 (T1)	41.5
Treatment 2 (T2)	26.9

The results of this plot did not indicate a significant statistical difference for yield between the urea treatment and the dairy manure treatment (LSD (0.05) =22.87).

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 urea. The addition of 28% UAN did improve the yield of the manure replications. Farmers utilizing dairy manure as a spring fertilizer source for wheat should plan to consider adding additional nitrogen and also plan to utilize the excess phosphorus and potassium applied in the following crop rotation.

Urea cost was $0.65 per pound. Urea replications had $61.75 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 9,000 gallons per acre as sidedress nitrogen using the manure tanker was $180 per acre.

Acknowledgement

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