

ENVIRONMENT

Title: Enhancing the Value of Swine Manure and Nutrient Availability with Application Timing and Cover Crops, **NPB #08-013**

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Date Submitted: 3/16/10

Scientific Abstract: Some swine producers are considering applying liquid hog manure in late summer (August) and then planting a cover crop to “stabilize” the manure-N in the upper soil profile rather than letting it be vulnerable to leaching losses. However, we are not aware of any data indicating this is a sound economical and environmental practice. Therefore, the overall objective of this field study was to determine the effect of late summer and fall applications of liquid swine manure with and without an oat cover crop on the nitrate distribution in the soil profile, uptake of nitrogen (N) by the oat cover crop, corn yield and N utilization by corn. An experiment was conducted on a Webster clay loam soil at the Southern Research and Outreach Center at Waseca. Fifteen treatments replicated four times were applied to plots measuring 50’ long x 10’ wide. Swine manure from a pit under a finishing barn was sweep-injected on August 8, September 2, October 1, October 31 and April 14 at rates ranging from 2815 to 4000 gal/A. The available N rate applied averaged 110 lb N/acre across the five application dates, and ranged from 79 to 144 lb N/acre. An oat cover crop (Forage Plus) was established on August 11 and September 4 and harvested on October 20.

The dry matter yield was 0.73 and 0.23 tons/acre while N uptake totaled 47 and 16 lb N/acre for the two dates, respectively. Soil samples taken to a 3-foot depth in early November indicated over 85% of the nitrate in the profile was found in the 0-1’ layer for the August, September and October 1 manure application treatments in this dry year. Samples taken in mid-June showed greater levels of nitrate in the 3-foot profile for the April application treatment compared to the fall manure treatments. However, there was very little evidence of leaching as 75% of the nitrate remained in the top two feet for all manure application dates. Nitrate found below the two-foot level ranged from 15% of the total in the profile for the April and October applications to 25% for the August application. Grain yields ranged from 210 to 223 bu/A and were not significantly different for the four N application dates when manure-N was applied at a non-yield-limiting rate and an oat cover crop was not grown. Oats planted as a cover crop on 8/11 or 9/4 reduced grain yields by 71 and 30 bu/A, respectively. Nitrogen uptake by the corn was slightly less for the August and September applications and was substantially reduced by the oat cover crop. With the exception of the oat cover crop, where the effect on corn yield and N uptake was the same in both years, corn production, N uptake, and soil nitrate were considerably different in 2009 (a dry year) compared to 2008 (a wet year). These 2009 results clearly showed that swine manure could be applied anytime from August 8 through April 15 without affecting corn grain production. However, total N uptake by the corn and nitrate-N in the soil profile were slightly greater for the April and October applications compared to September and August.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project’s principal investigator. This report has not been peer-reviewed.

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