

**Minnesota Department of Agriculture
Pesticide & Fertilizer Management
REPORTING
MARCH 31, 2020**

PROJECT DESCRIPTION: Updating nitrogen and phosphorus credits from manure to maximize fertilizer use efficiency in row crops

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1.) GOALS AND OBJECTIVES OBTAINED (*Specific to the work plan in the grant agreement, which goals or objectives have you accomplished. If possible, quantify progress made on each objective [example: we planted and maintained 10 of the 15 plots]. Include analysis, explanation, and specific reasons why goals and objectives were not met.*)

This is a 4 to 5 year project and we have only completed 2 years, so none of the goals or objectives have been fully met yet. We have made progress on the field experiments and incubation study, however. We have finished the first year field season at two sites in two locations (total of four site-years). We also have completed the second year field season at one site in two locations (two out of four site-years). We are continuing to process and analyze samples from the previous season now. For the incubation study, we are continuing to analyze the samples, although the field studies are being given priority with the current level of funding we have.

2.) ACTIVITIES PERFORMED AND OUTCOMES (*Describe the types of activities that you performed and the resulting outcomes...may include maps, photographs, etc.*)

Tasks 1A-1C were completed last year. Tasks 1D and 1E have been delayed but the soil samples continue to be further prepped for analysis (extracted, etc). Based on some initial soil sample results, we may need to analyze the soils for total N to understand the N pool better.

For the field study, Tasks 2A-2C were completed last year for Year 1 Site 1 at both locations (SROC and SWROC). Task 2D continues to be completed for Year 1 Site 1 as we continue to work on analyzing the large amount of samples we collected last year. Tasks 2A-2C were completed for Year 2 Site 1 and Year 1 Site 2 at both locations. We are working on Task 2D for the current year's data at this time. There has been a bit of a delay due to COVID-19 and restrictions working in the lab, but we intend to make up time once back in the lab.

Yield data was reported from the both growing season in the previous report. We also have information on nitrogen (N) uptake of the corn plots from the 2018 sites (2019 corn has not yet been analyzed due to COVID-19 restrictions regarding working on campus). Figures

1 and 2 shows N uptake in corn plots in the manure and N fertilizer treatments. An equation was fit to the N fertilizer treatments (which increased from 0 to 125% of recommended N applied) and N uptake from manure was compared to this equation to find the N fertilizer equivalent value. Tables 1 and 2 show the %N availability from the manure. All this data is preliminary.

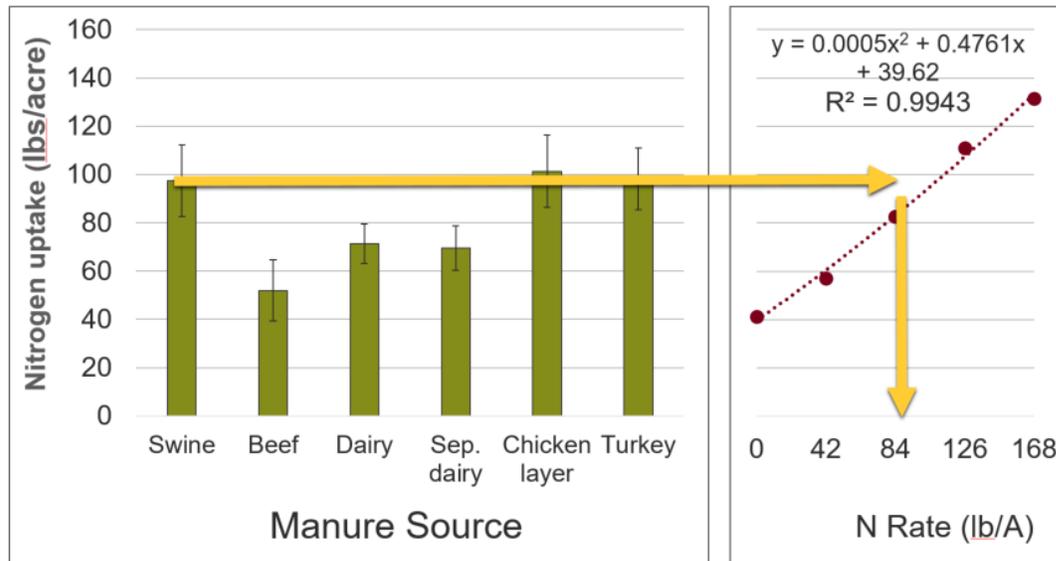


Figure 1. Nitrogen uptake of corn at Lamberton, MN in 2019 in manured plots. An equation was developed to model N uptake from fertilized plots (with a range of N applied from 0-168 lbs/A) and manured plots were compared to this equation to find the N fertilizer equivalent value.

Table 1. Preliminary data on N fertilizer equivalent values and %N available from manure in Lamberton, MN in 2018.

Manure Source	N Fertilizer Equivalent Value (lbs N/acre)	% N available (NFEV/Total N applied)	Assumed %N available
Swine finisher	109	45%	75%
Bedded beef pack	25	8%	60%
Dairy raw	62	22%	55%
Dairy Separated	59	22%	55%
Chicken layer (composted)	116	58%	70%
Turkey Litter	110	42%	70%

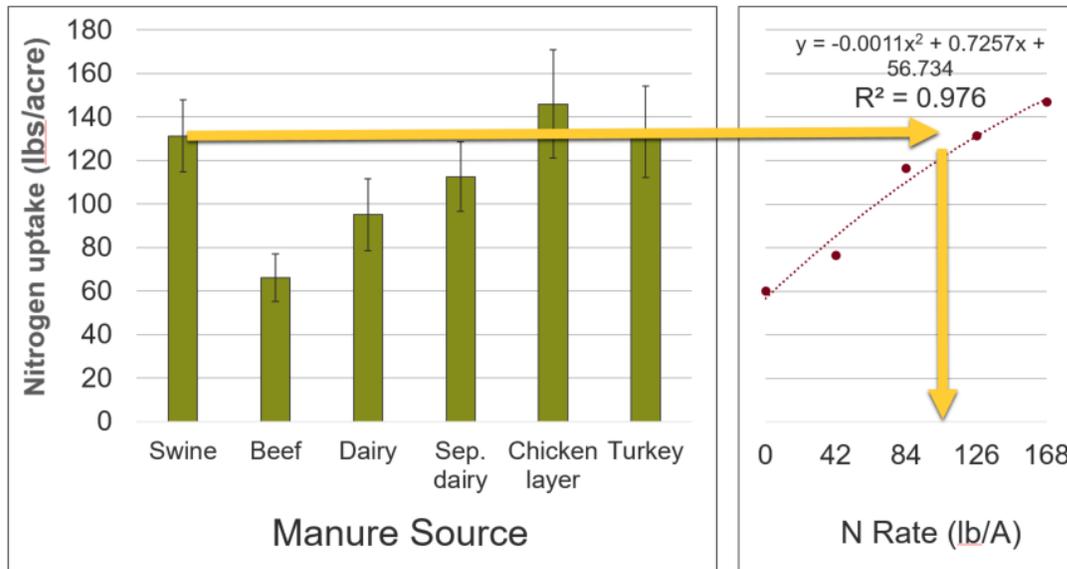


Figure 2. Nitrogen uptake of corn at Waseca, MN in 2019 in manured plots. An equation was developed to model N uptake from fertilized plots (with a range of N applied from 0-168 lbs/A) and manured plots were compared to this equation to find the N fertilizer equivalent value.

Table 2. Preliminary data on N fertilizer equivalent values and %N available from manure in Waseca, MN in 2018.

Manure Source	N Fertilizer Equivalent Value (lbs N/acre)	% N available (NFEV/Total N applied)	Assumed %N available
Swine finisher	127	55%	75%
Bedded beef pack	13	4%	60%
Dairy raw	58	21%	55%
Dairy Separated	89	34%	55%
Chicken layer (composted)	163	84%	70%
Turkey Litter	131	51%	70%

4.) FINANCIAL INFORMATION (*This may include balance sheets or general ledger. As listed in the grant agreement, no more than 10% of the total award can be moved from one budget category to another without prior approval. Describe any problems in this area and provide analysis, explanations, and specific reasons why any cost overruns or under spending may have occurred.*)

Please find the financial information provided by the University of Minnesota in the attachment. In this quarter we requested the movement of funds to pay for more laboratory analyses than anticipated initially. This was due in part to the adjustment from charging laboratory technician labor and supplies to grants to charging a per-sample lab analysis fee. We made these adjustments ahead of time when requesting funds for the upcoming year.