

Brown/Nicollet/Cottonwood Clean Water Partnership Farm Nitrogen Management Survey

The Brown/Nicollet/Cottonwood Clean Water Partnership (BNC CWP) has sponsored two farm inventory surveys during the past 4 years. The first survey, in the summer of 1993, focused on nitrogen practices in the three county area. The second survey was a follow-up survey in the late fall of 1996. The focus of the second survey was to gain additional information and to determine changes in nitrogen management practices. Results of the first survey can be found in the original report by Thomas Legg. The focus of this report will be on the findings of the second study and comparisons to the first study. Approximately three years (three growing seasons) have separated the two surveys.

The original survey (93 Survey) covered all farms on a field by field analysis of all nitrogen inputs. The second survey (96 Survey) was a much shorter survey and did not have a field by field analysis of each farm. Each interview in the 93 Survey took approximately 2 - 3 hours while the interviews in the 96 Survey took approximately 20 minutes. Forty-one farmers were interviewed in the 93 Survey while 34 of the original farmers were re-interviewed in the 96 Survey. Several of the original farmers had retired from farming in the three years between surveys.

The average age of a farmer interviewed was 49 years old at the time of the 96 Survey. The age of farmers was not asked in the 93 Survey. The average number of crop acres in the 96 Survey was 731 acres compared to 680 acres in the 93 Survey (Table 1). Total acres of crops were reduced as fewer farmers were interviewed in the 96 Survey compared to the 93 Survey. Average corn and soybean acres increased by approximately 30 acres each per farm.

Table 1. Crop Acres.

Survey Year	Total Crop Acres	Average Crop Acres	Total Corn Acres	Average Corn Acres	Total Soybean Acres	Average Soybean Acres
1993	27,894	680	13,569	330	12,916	315
1996	24,842	731	12,131	357	11,737	345

Twenty-seven farmers (66%) had livestock in the 93 Survey compared to twenty-one farmers (62%) in the 96 Survey. Ten farmers stated, during the 96 Survey, livestock numbers had remained steady. Six farmers reported a decrease in livestock numbers while five farmers reported an increase in livestock numbers (Table 2).

Table 2. Livestock changes in 1996 compared to 1993.	
Changes in Livestock Numbers	Number of Farmers
Increase by more than 25%	0
Increase by less than 25%	5
No change	10
Decrease by less than 25%	3
Decrease by more than 25%	3

Manure was a concern, an area where excess nitrogen was contributed, in the 93 Survey. Manured acres of the 18 farmers with livestock in 1996 were compared with manured acres in 1993. Three of the 21 livestock producers had only a few head of livestock and spread manure only in 1993, or in 1996. In 1996 the 18 farmers covered 1,646 acres with manure compared to 1,733 acres in 1993. Changes in livestock numbers may account for changes in acres covered with manure. Ten farmers had stated there was no change in livestock numbers and those farmers applied manure to approximately the same number of acres in 1996 (898 acres) as in 1993 (927 acres). Farmers were also asked if the rate of manure applied had changed over the three years between 1993 and 1996. Fourteen livestock producers responded their manure rates were the same in 1996 as in 1993. Six producers responded their rates had decreased and one responded his rates had increased. Four of the six livestock producers responding that their rates had decreased, also had a decrease in livestock numbers. From comparison of the actual acres covered to the answers from the question on rate of manure, it appears farmers were both honest and consistent in answering manure rate questions on the survey. Over all, it appears there was very little change in the rate of manure application.

Eleven (52%) of the livestock producers had tested their manure in the past for nutrients. Seven of the livestock producers who had their manure tested, test manure on a regular basis (at least once every three years.) Four livestock producers also had their manure spreaders calibrated.

Demonstration plots are often a source of information where farmers can learn about different seed types, fertilizer applications, manure applications, and tillage. Twenty-one farmers (62%) attended some type of plot demonstration. Farmers attended plots by seed companies more than plots sponsored by other sources (Table 3). Demonstration plots appear to be an effective method of demonstrating different practices available to farmers.

Table 3. Where Farmers Attended Plot Demonstrations.	
Source of Plot Demonstration	Number of Farmers
BNC CWP	6
Cooperatives	5
Minnesota Extension Service	7
Seed companies	10
Other	6

Nitrogen fertilizer applications in 1996 were similar to fertilizer applications in 1993. Table 4 compares commercial nitrogen applications on corn acres without any manure applied for the 34 farmers who were surveyed in 1996.

Table 4. Commercial Fertilizer Nitrogen Applications in 1993 and 1996.				
Crop Scenario	Commercial Fertilizer Nitrogen Applied.			
	1993 Nitrogen Applied	1993 Yield Goal	1996 Nitrogen Applied	1996 Yield Goal
Corn Following Corn	144	141	150	143
Corn Following Soybeans	145	150	140	146

Commercial nitrogen applications were very similar when comparing 1993 applications to 1996 applications. Recommendations from the University of Minnesota (UM) for nitrogen on corn have changed substantially since the 93 Survey. Recommendations for nitrogen for a corn crop with a yield goal of 150 bushels per acre, grown on a soil with medium organic matter, is 120 pounds per acre today. Before 1993, for the same scenario, 180 pounds of nitrogen per acre would have been recommended. Likewise, today corn fields are given a 40 pound nitrogen credit per acre if soybeans was the previous crop. Previous to 1993 corn would have been given a 30 pound credit for the same scenario. Nitrogen applications on corn are similar in 1996 when compared to 1993, and recommendations for nitrogen have been reduced substantially in 1996 when compared to 1993. Therefore, farmers are over-applying nitrogen at a higher rate in 1996 than in 1993 when comparing nitrogen rates of farmers to UM recommendations.

Farmers were asked how they determined the amount of fertilizer to apply on their fields. Farmers listed sources and the importance of those sources in determining rates

of fertilizer. Cooperatives were the primary source of fertilizer recommendations with 31 farmers using them as a source to determine fertilizer rates and 21 farmers stating they were the primary source of information (Table 5). Farmers also relied heavily on their own knowledge (past experiences and neighbors knowledge) and crop consultants.

Table 5. Sources Used to Determine Fertilizer Recommendations in 1996.				
Source	Number of Farmers in Regard to Priority.			
	First	Second	Third	Below Third
Farmer Knowledge	4	11	3	3
Cooperative recommendations	21	8	0	2
Crop Consultant	5	3	1	0
Seed Companies	2	1	1	0
Extension Agents	0	3	3	1
UM Data	2	4	7	2
Local Programs such as BNC CWP	0	3	4	6

Farmers were asked where they would like to see projects such as BNC CWP focus their educational efforts. Farmers felt strongly that water testing, manure testing and operation of test plots were areas that projects such as BNC should focus their efforts (Table 6).

Table 6. Where Should Projects Such as the BNC CWP Focus Their Educational efforts?				
Source	Number of Farmers in Regard to Priority.			
	First	Second	Third	Below Third
Water testing	15	4	4	0
Manure testing	6	13	3	0
Educational brochures	0	2	1	2
Educational Classes	3	4	3	0
Test Plots	8	4	2	0
Booths at fairs and meetings	0	1	3	1
None - Use private industry	4	0	0	0

When asked if the general rate of nitrogen had changed in 1996, twenty-three farmers reported their nitrogen rates applied on corn did not change since 1993. Six farmers reported a decrease in rates and two farmers reported an increase. Based on comparison of actual rates from 1993 to actual rates in 1996 (Table 4) and on answers

to the question of did your rates change, overall rates of nitrogen applied to corn in 1996 were very similar to rates in 1993. Farmers who reported decreases in nitrogen rates reported reduction was a result of either soil testing or information from government agents such as a county extension agent.

Eighteen farmers reported they had tried nitrogen reduction on corn in the past three years. Six farmers tried reduced nitrogen rates on a whole field and 8 farmers tried reduction on a strip across a field. Twenty farmers also reported the majority of the commercial nitrogen was applied in the spring. Eight farmers, who applied the majority of nitrogen in the fall, had experimented with spring applications.

Summary

Forty-one farmers were surveyed in 1993 and 34 of those farmers were again interviewed in 1996. The amount of crop acres had increased slightly, from 680 acres to 731 acres in 1996 when compared to 1993. Corn and soybeans accounted for over 90% of the crop acres. Twenty-one farmers had livestock in 1996. Ten farmers stated there was no change in livestock numbers, five farmers reported an increase and six farmers reported a decrease.

Manure rates appear to be very similar in 1996 when compared to manure rates in 1993. Eighteen farmers applied manure in both 1993 and 1996. Acres covered were 1,733 and 1,646 respectively. Ten farmers reported no change in livestock numbers and those farmers spread manure on 927 acres in 1993 and 898 acres in 1996. Six farmers did state they reduced manure rates while only one farmer stated he increased manure rates. Overall, manure rates were about the same in 1996 when compared to 1993.

Over one-half (11) of the livestock producers have tested manure for nutrients with seven farmers testing manure on a regular basis. Manure testing is very important to correctly credit nitrogen for the following crop. Four livestock producers also had their manure spreaders calibrated. Manure testing and manure spreader calibration are two important components in correctly accounting for nitrogen credits from manure.

Commercial application rates of nitrogen were similar in 1996 when compared to rates in 1993. On acres of corn with manure applications, and on acres of corn following soybeans, reduction in commercial fertilizer may be possible with little risk to yield potential. Cooperatives were the dominant source farmers used to determine nitrogen rates. If farmers have someone other than themselves determine nitrogen rates, it is critical manure applications and previous legume crops are reported to them. With nitrogen near \$0.20 per pound, farmers may be able to save up to \$8.00 or more per acre on nitrogen costs. Recent work by the UM and others have lead to a reduction in UM recommendations for nitrogen on corn.

Water testing, manure testing, and test plots are three areas where farmers strongly feel that projects such as the BNC CWP should focus their attention. Manure testing and

test plots could provide an opportunity for farmers to actually see how valuable it is to credit manure and legumes.

Several farmers reported trying reduced nitrogen rates on corn acres and trying spring application of nitrogen on corn acres. It is important to determine what barriers prevent farmers from actually implementing these practices on a farm wide basis. Additional research would be very useful to determine these barriers and how these barriers may be removed or reduced.