Corn Silage yield and Quality Results for Calumet County

By
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Bryce Larson was the recipient of a $1,054 grant from the Eastern Wisconsin UWEX District to research the quality and yield differences of corn silage over a wide range of nitrogen application rates.
Bryce was researching the premise that if the corn crop or plants were under nutrient stress or other stresses that the corn plant would in its efforts to create a successful reproductive kernel or kernels that other portions of the corn plant may be sacrificed to accomplish that seed maturation process.

The following is a description of the trial sites and the protocols utilized. The two sites also were part of a Maximum Return to Nitrogen (MRTN) trial and thus all the soil samples, PSNT samples were taken, summarized and paid for through other fund sources.

There were two plot sites chosen for this corn silage trial. Both of the sites were on land rented by Adam Faust and the sites were located east of Chilton in the township of Charleston on Kewaunee red silty clay loam soils. The soil type was KnB which indicates 2-6% slope.
The plots were planted with two different 92 day RM hybrids that are corn grain or dual purpose corn varieties. I wanted to have dual purpose type varieties as the genetics for corn grain yield is emphasized heavily in these varieties and that tendency should have offered more opportunity that impacted non grain portions of the corn silage more than varieties that have not been so intensively selected. The plots were planted on May 17, 2009 with a 6-row no till corn planter in 30 inch rows at 34,000 kernels per acre. The previous crop was no till soybeans.
In June of 2009 dry urea was purchased from Agri Partners Coop and applied to the two sites. The dry urea was applied at the following rates. The rates were 0, 40, 80, `20, 160 and 200 units of N per acre. There were 3 replications of each application rate at both sites or we had a total of 36 replications.
The plots were monitored and stand counts were taken throughout the summer.
The spring was cool and wet and thus the no till corn in the heavier soils was planted later and emerged and grew more slowly in the cool conditions. Soon after our N applications in the 2nd week of June we went through a 7 week very dry spell were we received less than one inch of rain over a total of 54 days. The corn crop was thus shorter and more yellow than would typically be expected.
During a 10 day period in early to mid August the plots received 2 to 2.5 inches or rain fall and the crop turned green and pollination was successful but the internodes were close together and our crop remained shorter than typical.

Adam Faust had determined that this crop would be harvested for HMSC and thus we would have to hand harvest the plot for corn silage as well as grain.

We chose September 29th as the day to harvest our corn silage plot as we also had a corn silage dry down event scheduled and we had the chopping equipment and I had rented some space and a certified scale at the Coop as well. We cut 1,000th of a row or 17. feet 5 inches from two of the 6 rows in each replication. The outside two rows were used as buffer rows to separate the replications from the various application rates.
With an average of 32,000 plants per acre we harvested roughly 60-65 plants per replication and with 36 replications we cut, weighed and chopped roughly 2,000 stalks of corn silage. We took representative samples from each of the 36 replications and these samples were delivered to the Marshfield, Wisconsin UWEX testing lab where they conducted a Milk 2006 sample on each of the 36 samples. Measuring the corn quality and getting the milk per ton was a critical portion of this trial and thus we chose to utilize the milk 2006 tests even though that was a cost of "$16.00 per sample. Members of the Calumet County Forage Council harvested, weighed, chopped and delivered the samples to the Marshfield Lab.

Please note the two attached Excel Spreadsheets that list all the quality and quantity data from the Milk 2006 sampling.

The two plots were about 1.5 miles apart. Both plots were in KnB soil types and planted on the same dates. The Bancroft plot or plot #1 was a plot that soil tested in the lower optimum range and had more stress due to lower moisture and rainfall as the plot was on one of the steeper slope portions of the field. The plot on Y or the number 2 plot was on a more flat portion of the field and the soil tests showed high and or excessively high nutrient content at that site.

I have tabulated the results and combined the replications and have determined that there is no milk per ton or quality loss in the 0 and low level N application replications. In fact one could say there was very slight milk per ton increase in quality on the plots that received the least N. The dry matter yields did respond accordingly to the increased N application rates but not as significantly as did the corn grain yields did. I have included the corn grain yields here for your comparisons. The milk per acre values are the sum of the milk per ton times the dry matter yields and thus show the combination of those two calculations. As you can see milk per acre responds with dry matter yield but the milk per acre values do not show as significant increases as do the corn grain yield responses.

The university can not make management protocol recommendations on one year's worth of data even if the trial followed the proper replication protocols. I believe that to be a valid and important consideration. The data collected to date indicates that as expected yields increase and the crop responds to nitrogen. It does seem that total dry matter yield does not increase in the same proportion as does grain yield. (We must note here that 2009 was a very cool growing season and that the internodes on our corn do to cool and dry conditions caused our corn plants to be considerably shorter than normal for our region of the state). I was very pleased to see that milk per ton or corn silage quality did not decrease when the corn plants were subjected to N shortages and or other stresses such as cool and very dry conditions. The fact that the corn plant seems to be a "smart" plant and takes care of itself if you will to me is a good thing. Here in our part of the state

many rations for dairy cows contain as high as 70% of the dry matter forage in the form of corn silage and if nutritional shortages and other stresses would cause the corn silage to be of considerably lower quality by that I mean lower in energy and higher in NDF poorly digestible fiber such as lignin that could be a very costly problem for our dairy farmers to resolve.

As mentioned above I have included the spreadsheets from the UW Marshfield Lab with the milk 2006 data. I have also included the tabulated results from the 3 replications of the 6 varying N rates for both sites.
I have also included the corn grain yield portion from the MRTN trial for your comparison.

I again want to thank the Eastern District of the UWEX for offering me this opportunity to do this trial and help me better understand the relationship of nitrogen fertilization rates and their impacts on corn silage yield and quality. I will be sending this data to the UWEX Corn Agronomist Joe Lauer for his review as well.

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