Some points on moisture/drought stressed corn harvested prior to maturity

Ted McCollum III

1. Moisture stressed corn plants usually have an elevated nitrate concentration. Usually nitrate is converted to amino acids and protein by the plant. Under stress, the conversion slows and nitrate accumulates in the stalk. Highest concentrations are in the bottom of the stalk.

Because of the nitrate accumulation, silage is a better option than green chop, haying, or grazing. Green chop, hay, and grazing expose cattle to the high nitrates levels. On the other hand, if the stressed corn is properly ensiled and a good fermentation occurs, the nitrate levels will decrease 25-65% during ensiling (at least 2-3 weeks time of ensiling) and reduce the risks of toxicity when feeding.

Nitrates in the silage, hay, green chop can be reduced by raising the cutting height. Some field observations show that nitrate levels were 50% lower when stressed corn was cut at 12 in. height rather than 4 in. height. Of course yields were lower when the cutting height was raised.

Test the silage again before feeding to determine nitrate levels. Mix silage, hay or green chop with other feeds to bring nitrate level (as a % of dry matter) of entire diet down into a safe range.

Ensiling high nitrate forage can result in the production of nitrogen oxide gases from the silo. These are toxic and lethal to humans and livestock. These gases are brown colored and presence may be noted by brown discoloration of the silage or pit walls or floor. Anyone working near the silage for the first week to month after ensiling should take care around the pit, especially if air movement is limited.

2. Feeding value of silage from stressed corn can be lower than regular corn silage because of the reduced content or total absence of grain. However, the feeding value may not be as low as perceived. The fodder portion of the plant can have a higher nutritional value than in normal corn silage depending on what stage of development the stressed corn is harvested. Corn harvested in midseason will have an elevated crude protein content and the fodder will be more digestible than corn silage harvested at later stages of maturity. In a test conducted in 2010 (see below), corn that was in the tasseling stage was similar in nutritional value to sorghum/sudangrass cut for hay.

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Corn yield and nutritional comparison to sorghum/sudangrass harvested 67 days after planting.

<table>
<thead>
<tr>
<th>Type</th>
<th>Yield, DM Ton/acre</th>
<th>% Moisture</th>
<th>% Crude Protein</th>
<th>% NDF</th>
<th>% In vitro True Digestibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMR Sorghum</td>
<td>2.9</td>
<td>78</td>
<td>12.8</td>
<td>54.7</td>
<td>84</td>
</tr>
<tr>
<td>NonBMR Sorghum</td>
<td>3.5</td>
<td>76</td>
<td>12.1</td>
<td>55.8</td>
<td>82</td>
</tr>
<tr>
<td>Corn</td>
<td>2.8</td>
<td>81</td>
<td>14.4</td>
<td>55.8</td>
<td>83</td>
</tr>
</tbody>
</table>

3. Follow normal steps for ensiling corn silage.
   *Moisture content* – moisture should be in the 65-70% range for trench/bunker/on the ground ensiling. Excessive moisture results in poor fermentation and reduced feed value. Again, poor ensiling may not reduce the nitrate levels in the silage.

Most stressed corn that is harvested earlier than normal will have high moisture levels. If the moisture content is above 70 percent, either (1) delay harvest which may further reduce feeding value and possibly increase nitrate content, (2) windrow the corn and let it wilt in the field before chopping for silage, or (3) mix silage with dry ingredients like cracked corn, dried distillers grains, or ground hay to bring the moisture content down to 65 to 70 percent for proper ensiling. It takes about 35 pounds of corn, dried distillers grains, or hay (assuming 88 to 90 percent dry matter) to reduce the moisture content of one ton of wet silage by one percentage point.

*Inoculate* - Use good inoculant to enhance ensiling.

4. Yield estimation
   Based on height of plants, a rough estimate is about 1 to 1.3 ton of silage (70% moisture)/ac for each foot of plant height. I.E., corn that is 4-5 ft tall would produce about 4-6.5 tons per acre of silage with 70% moisture (or about 1.2 to 2.0 tons/ac dry matter basis).