

Checking the Back Forty



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Frost Edition Frost Edition Frost Edition

Frost Warning and Immature Crops

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As most are aware there is a frost warning in many areas of the state over the next 48 hrs. For many areas we are fortunate to have made it this long without a frost but there are still numerous crops out there that will be impacted by this frost. I know many of you have resources on this topic but I wanted to share a few I had on file that might be helpful.

As you know assessing the difference between a light frost and a killing frost will have significant implications on harvest strategies. While there are decisions that need to be made with grain crops (and there are resources here that address that) when it comes to corn silage the decisions made in reaction to a frost can have particularly large impacts. Getting out into the fields to make these determinations will be critical to arriving at the correct course of action.

The difference can be making the best of a challenging situation resulting in a useable forage with minimal losses exacerbating the problems that arise from this challenge resulting in poor forage with high losses

The resources included with this document (The “*Will Your Corn Make High Moisture Corn?*” article at the end) outline differences between a light and killing frost. With a light frost the plant will look dead because the leaves will die but the stalk and ear will still be alive and continue to mature. Contrary to how the plant appears from a visual assessment, the rate of dry down after a light frost will be SLOWER as the plant has lost its photosynthesis factory (leaves). It is important not to jump the gun on corn silage harvest after a light frost.

In the event of a killing frost, the stage of plant maturity at the time of the frost will be important in determining how quickly silage harvest should occur. If the corn is near proper maturity for silage harvest, harvest should commence pretty quickly. If the crop is immature it will still need some time to dry down in order to give it a chance at proper fermentation and there is a real balancing act between waiting on dry down and risk of further damage in the field.

An article from Wisconsin (link to full article below) states the following

“Corn silage should be harvested at the appropriate moisture content for the type of silo in which it will be stored (Table 3). If corn is frosted prior to 50% kernel milk, the moisture content of corn may be too high to be properly ensiled. However, during the drydown period, dry matter yield will decrease due to

leaf loss, plant lodging and ear droppage. Thus, a trade-off exists between moisture and yield.

For corn silage frosted prior to the dent stage, the moisture content will be too high for successful ensiling. The silage crop should be allowed to dry in the field for several days and moisture content should be monitored. For corn frosted during the dent stage, harvest should begin quickly to prevent yield loss as damaged leaves are shed or break off the plant.”

The following tips are included in an article from Larry Chase, Management Considerations for Immature and Frosted Corn Silage (link to full article below).

“Frosted Corn:

In some years, there is a killing frost before corn has reached maturity for harvest. Key points to consider in this situation are:

- The leaves will quickly turn brown and the plant will appear “dry”. This gives a false reading on whole plant DM since the leaves are only 10 – 15% of the total plant weight on a DM basis. Most of the plant moisture is in the ear and stalk.
- Whole plant DM needs to be determined to assess when to harvest. Corn for silage should be > 32% DM before starting harvest.
- Frost may kill some of the normal bacteria on the plant. A research proven inoculant may assist in getting a good fermentation started.
- Harvest as quickly as possible. This lowers the risk of the plant getting too dry and potential mold growth on the ear.”

In regards to fungal pathogens (molds) this is another example where we need to recognize the differences between risk of mycotoxins and the risk of feed hygiene (heating, palatability, animal health) issues. It is important to keep in mind that the majority of fungal pathogens that produce mycotoxins inhabit living plant tissue and it is likely that if mycotoxins are going to be present in a crop they are already there at this stage in the season.

While there are a few exceptions the vast majority of molds that inhabit dead tissue do not produce mycotoxins and therefore molds that develop on dead tissue after a frost may increase the chances for feed hygiene issues but are not likely to have a significant impact on whether a mycotoxin is present or not.

One thing that is consistent with these two different challenges (mycotoxins and feed hygiene) is that laboratory testing for their presence prior to feedout can help you catch the problem and develop a plan for minimizing its impact on your herd before you begin incorporating these feeds into your ration and the cows tell you there is a problem.

Resources

Frost Effects on Corn: University of Wisconsin:
<http://corn.agronomy.wisc.edu/Management/L041.aspx>

Effect on the soybeans
Nebraska: <https://cropwatch.unl.edu/frostfreeze-effects-corn-and-soybean>

North Dakota: <https://www.ag.ndsu.edu/winterstorm/winter-storm-information-farm-and-ranch-information1/farm-and-ranch-crops-soybeans/assessing-frost-damage-in-soybeans>

Recent PRO-DAIRY resources related to corn silage management

Fall Corn Silage Harvest Resources

https://www.cvent.com/pub/eMarketing/Pages/WebEmail_New.aspx?emstub=0c8c167a-def8-409a-b41f-7904a591987b

- Corn Silage 2019: Two Different Crops
- Wet Corn Silage can be an Environmental Challenge
- Management Considerations for Immature and Frosted Corn Silage

2019 Corn Silage Harvest: An Exercise in Patience

https://www.cvent.com/pub/eMarketing/Pages/WebEmail_New.aspx?emstub=b3d831a7-843c-45cf-ad5e-fce4690883fd

Will Your Corn Make High Moisture Corn?

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What are the chances that your corn will make high moisture grain corn? This sounds like a good question to be asking. The answer to this is not very easy, however, the corn's growth stage at the time of our first killing frost will help us make this decision. Our cool, wet spring delayed corn planting this year. There are still many growers hoping to harvest high moisture corn this fall.

What is a killing frost? According to Joe Lauer, Corn Agronomist, University of Wisconsin, corn will be killed when temperatures are near 32° F for a few hours, and when temperatures are near 28° F for a few minutes¹. Less damaging frost can occur when temperatures are around 32° F and conditions are optimum for rapid heat loss from the leaves to the atmosphere, i.e. clear skies, low humidity, no wind and low lying areas. Grain yield will continue to increase about 7 to 20% after a light frost that only kills the leaves as long as the stem is not killed.

Table 1. Potential grain yield losses after frost.

Corn development stage	Killing frost (Leaves and stalk)	Light frost (Leaves only)
	percent yield loss	
R4 (Soft dough)	55	35
R5 (Dent)	40	25
R5.5 (50% kernel milk)	12	5
R6 (Black layer)	0	0

derived from Afuakwa and Crookston, 1984

After a light frost, the corn plants will appear much drier than they really are. The frosted leaves make up only about 10 to 15% of the total plant weight. The stalks and ears will still be holding quite a bit of moisture. If any leaves, especially above the ear, or even the stalk and husk are still green after a frost, grain dry weight will continue to increase until the black layer forms at kernel tips².

If the corn was hit by a killer frost in the milk stage, yields have the potential to be very low and the grain will be very light and chaffy. It is also a nightmare to try to harvest this corn for grain. The cobs will likely be very spongy and it is difficult to get the kernels off of the cob. This corn should be made into corn silage only.

If the corn was in the dough stage, yields may be reduced by 50%. The test weight of the corn in this stage could also be low. It would not be surprising to harvest corn with test weights under 50 lbs/bu. This corn will need to stay in the field for an extended period of time. In the soft dough stage the kernel moisture is usually between 60-62% moisture. This long field drying will also

make the corn susceptible to lodging due to European Corn Borer damage and rotted stalks.

Ev Thomas from the Miner Institute suggests that if the corn has any kernel milkline visible, even as little as 1/3 milkline, there will be a good chance the corn will make grain. Any corn with a kernel milkline is a good candidate for high moisture corn. If there is any milk in the kernel cap, consider chopping this corn and don't risk trying to harvest this corn for grain.

If the corn is in the late dent stage at the time of the frost, yields and test weights should be near normal. Chances are there may not be a lot of corn at this stage of growth when we receive our first killing frost. We can only hope that we get a later than normal frost this fall.

David Morris, former Soils and Crop Advisor, OMAFRA, wrote this about black layer. "Under normal conditions, black layer formation (end of grain filling), occurs when the grain contains about 32% moisture." Watch out for premature black layer formation. "A black layer will form whenever grain filling is stopped, even if the kernel is not completely filled. Thus, the presence of a black layer in grain that was frosted is not a sign that the corn is "mature" in the normal sense." Several days of cool temperatures (daily highs of 45 to 55° F) during grain fill may result in premature black layer formation, ending further grain yield increases even if another frost has not occurred².

Consider the corn hybrid when making your decision as to which fields will make grain corn. Ev Thomas mentioned that the new highly digestible hybrids should be harvested for silage only. These hybrids have a very soft endosperm. There is some concern that the soft endosperm can act as a sponge for mycotoxins. This was found to be true on a farm that Ev worked with four years ago. The companies that sell these hybrids encourage growers to plant them for silage only. It appears that this is very sound advice.

Mother Nature provided us with another growing season to remember. It is unfortunate that the delayed planting season will prevent some growers from harvesting any corn for grain. Soon it will be time to decide what corn should be chopped for silage and what corn could make grain. Right after our first frost you need to make a decision as to whether or not your corn is going to make grain. Delaying this decision may result in corn too dry for silage and too immature or wet for high moisture corn.

References:

¹What is a killing frost in corn?, J. Lauer, Corn Agronomist, University of Wisconsin

²Handling corn damaged by autumn frost, publication NCH-57, National Corn Handbook