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## Frost Damaged or Immature Corn: Forage Options

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## Frost Damaged or Immature Corn: Forage Options

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Delayed spring planting and early frost can each contribute to significant reductions in grain yield and (or) the value of the grain due to low test weight or high moisture. Under these circumstances, consider alternative harvest options for your corn crop. One viable option is to harvest the crop as forage.

Generally, the first option producers think of when faced with immature or frost-damaged corn is to chop the fields for silage or earlage. While this method of harvest will work extremely well and can provide several tons of high quality feed, it may not be the best option if you are not accustomed to making silage. Other alternatives include grazing the corn plants in the field or harvesting the crop as hay.

### Grazing corn

Most livestock producers feel grazing standing corn is somewhat risky. However, results of experiments conducted in the U.S. and Canada suggest that grazing standing corn as part of an integrated livestock production system can provide several months of low-cost, high-quality feed for beef cattle and, if managed correctly, can be accomplished with little risk of digestive disorders such as bloat, acidosis, or founder.

Two significant challenges of grazing standing corn are fencing and water.

Many crop fields in the Upper Midwest do not have perimeter fencing; however, it is relatively easy and inexpensive to purchase and erect temporary fencing. As long as there is some grain and leaves and husks remaining in the field, a single strand of electric fence attached to temporary posts will be sufficient. Once the cattle are forced to consume stalks and cobs, they will likely become more restless and begin to challenge the fences.

For most producers, hauling water will be the only option to get drinking water to cattle on corn residue. However, if grazing standing corn or other crop residues is likely to become a normal part of the production system, it may be cost effective to develop water supplies nearer to the fields. This is a decision that will have to be weighed out on an individual basis.

Grazing corn also brings a slight risk for digestive disturbances in cattle. Disorders such as bloat, acidosis, and founder can occur in cattle grazing corn residue. However, the risk for these conditions will vary greatly with the amount of grain in the field.

A good way to avoid these problems is to provide the cattle with increasing amounts of grain for 10 to 14 days prior to turning them out on the residue. This helps the rumen microbial population adapt to a higher grain diet.

It is also wise to use cross fencing that will allow the cattle access to only small portions of the field at any one time. If they have access to only two to three days worth of feed at a time, the animals will generally be forced to consume a substantial portion of the forage parts of the plant along with the grain. This can significantly reduce the potential for digestive disorders. Another problem to watch for is nitrate toxicity, a potentially deadly disorder in beef cattle.

It is generally accepted that the highest nitrate concentrations in corn plants are in the lowest 18 to 24 inches of the stalk. Yet the stalk is near the bottom of the list of preferred feeds for cattle grazing corn residue. Thus, unless the fields are grazed extremely heavily, nitrate toxicity under grazing conditions is unlikely.

Compaction is also a concern when grazing standing corn. Recent research from Iowa State University suggests that compaction on corn stubble is not an issue once the soil is frozen. Prior to freezing there is potential for a small reduction in the next year's soybean yield in a no-till rotation. No difference in yield was observed in conventional tillage systems.

### **Harvesting as hay**

In recent years, producers have also elected to harvest corn as hay. This method is not recommended because of the difficulty in drying the stalks. As with other hays, corn hay that is baled too wet is susceptible to mold, heating, and spontaneous combustion.

If you harvest corn as hay, shred, crush, or crimp the forage to aid in the drying process. Ideally, the whole plant moisture content should be below 20% prior to baling. If the bales are harvested at 50 to 60% moisture and stored in an oxygen-limited environment (sealed bag or wrap) it may be possible to create baleage.

Limiting the oxygen is absolutely essential. Any punctures or holes in the protective cover that are made by the stalks will result in heating and molding.

### **Harvesting as silage**

Harvesting frost-damaged and (or) immature corn as silage is not greatly different from making silage from

more mature corn. However, it is significantly more difficult to estimate the moisture content.

Fields that have been damaged by frost will frequently appear drier than they actually are. Leaves that have been damaged by frost will brown and dry rapidly; however, the stalk, ears, and undamaged leaves are still wet.

Do not rely on the milk line as an indicator of moisture content in frost damaged immature corn. Instead, you will need to weigh the whole plant moisture content of the corn against the potential reduction in dry matter due to leaf loss when determining the appropriate time to harvest silage.

If extensive leaf loss has already occurred, the nutritive value and amount of dry matter remaining should be carefully evaluated to determine if it is economically wise to harvest the crop as silage.

The nutritive value of silage from immature corn will depend on the stage of maturity. If the corn has little or no grain, the nutritive value will be reduced somewhat; however, silage from corn that has had some ear and kernel development can have similar energy content as that produced under normal conditions.

According to the University of Minnesota, corn in the blister stage can be as high as 80% moisture, significantly higher than what is recommended for proper ensiling. To ensure proper fermentation in a horizontal silo, the moisture content should be between 63 and 68%. For upright silos, moisture should be between 60 and 65%.

Silage that is too wet will likely have excessive seepage and an off odor. The effluent (fluid that seeps out of the silo) contains a high amount of nutrients, which reduces the nutritive value of the forage and could potentially be an environmental concern. The effluent also contains organic acids that are necessary for proper ensiling and preservation of the crop.

Finally, the fermentation that occurs at higher moisture concentrations can result in the production of butyric acid, which gives the silage a sour smell that can reduce palatability and potential feed intake.

In contrast to immature corn, mature corn (as indicated by a black layer on the kernel) will dry very rapidly after a killing frost. We suggest you strongly consider cutting the silage as soon as possible after the frost, setting the equipment to chop the silage as fine as possible.

If the moisture content drops below 60%, add water to bring the moisture content to a more desirable level.

Harvesting silage that is too dry can create problems. Dry silage can be difficult to pack properly, and it can lead to heating and mold development. Heating in the silo can result in a reduction of feed value. It also can be a safety concern: When opening a heated silo, there is potential for spontaneous combustion that could result in personal injury or property damage.

Silos that contain silage of questionable moisture content should be monitored closely and care should be taken when opening the silo for feeding.

More information on proper techniques for making silage from immature or frost damaged corn is available in ExEx 8150, Silage from Immature or Frost Damaged Corn, available online at <http://agbiopubs.sdstate.edu/articles/ExEx8150.pdf>

Several different techniques will directly assess the moisture content of your fields. One of these techniques utilizes a small kitchen scale and a microwave oven and is quick and accurate. Consult ExEx 8077, Use a Microwave Oven to Determine Moisture Content of Forages, available online at <http://agbiopubs.sdstate.edu/articles/ExEx8077.pdf>



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