Managing Immature and Frosted Corn Silage

By Heather Darby, UVM Extension

Timely harvest of corn silage is one of the most critical factors affecting forage quality. To ensure maximum yields of dry matter, nutrients per acre, palatability, intake, and minimize storage losses corn should be harvested at 35-30 % dry matter.

This season delayed planting and cool weather has led to a number of cornfields that likely will not mature (35-30%) before the first killing frost this fall. This article will highlight strategies that may help reduce yield and quality losses associated with immature forage.

When should immature corn be harvested?

After a frost, immature corn will most likely be too low in dry matter content (high in moisture) for direct chopping. If possible harvesting should be delayed until the plant is below 30 % dry matter. Harvesting the plant at low dry matter content will alter fermentation, increase silage runoff, and could potentially decrease feed intake. To avoid seepage losses and risk of an undesirable fermentation, it will be necessary to allow the immature crop to stand in the field for several days following a frost for further drying.

Determining the moisture content of the crop after it is frosted can be tricky. After the plant is frosted, the leaves turn brown and give the appearance of rapid dry down. However, since most of the moisture is in the stalk and ear the plant will be at a lower dry matter than it actually appears. Most experienced farmers can estimate moisture contents for normal maturity crops, but will likely underestimate the moisture content of an immature crop. Remember frozen immature corn will not dry down any faster than unfrozen corn. The only sure method to determine dry matter is to chop a small amount of the crop with the chopper and obtain a moisture determination (microwave method or Koster Tester) to know when the crop is nearing the desired 35 – 30 % dry matter. As a rule of thumb, whole plant moisture normally decreases by 0.5 % per day. Plant material of 30 % or slightly higher dry matter can be more effectively stored in a horizontal bunker or stack without excessive seepage losses than in an upright silo structure.

Addition of absorbent materials such as ground grain or straw can be used to reduce moisture. However, it is an unlikely practice since for every 1% change in DM content, you'll need to add 30 lbs of dry material per ton of silage. For example, if the crop is 25% DM but you want 32%, you would need to add 210 lbs of dry grain.

Under the best of conditions, preservatives and inoculants are generally not necessary for corn silage, however, this may be a year to consider their use. Be sure and use proven products and follow the manufacturer's directions.

How should you store immature silage?

Silage management practices are critical to harvesting and storing immature corn. Packing, covering, and particle size guidelines used in harvesting normal corn silage should be followed for immature corn silage. If possible store immature corn separately from high quality corn silage. Very immature corn silage should be fed to animals with lower nutrient requirements

How to feed immature corn silage?

Immature corn silage is a unique feed. Not surprising, immature corn can be expected to yield less silage. If the corn is at the dough stage it generally has anywhere from 65 – 85 % of normal silage yield. Slightly immature, frost damaged corn that has dented can still make good quality corn silage. As shown in Table 1, while yield is compromised the overall energy content is similar to more mature corn silage with kernels containing normal starch fill.

The decline in energy of slightly immature corn is not as great as one might expect because the stalk ADF and NDF is more available. The fiber (ADF and NDF) content of the plant will be higher but less lignified and therefore more digestible than in mature silage. In addition the kernel texture and starch will be softer and more digestible. However, starch levels are likely to be lower. Immature corn will also be higher in protein than those of a fully matured crop. After a frost, if the leaf material is dead but the stalk and roots remain alive, there is a chance nitrates will accumulate in the lower stalk. Increasing the cutting height will lower dry matter but increase silage quality since the lower stalk has the lowest digestibility and highest nitrate levels.

Field losses will increase with time so producers need to balance harvest losses against fermentation loss and quality problems associated with wet silage. It will be essential to test forage made from immature corn as there will be a large variation from the nutrient content that might be expected. If you are going to feed a significant amount of this type of silage to lactating cows, it may be worthwhile to obtain a fermentation analysis that includes silage pH, ammonia, titratable acidity, lactic, acetic, proprionic, butyric and isobutyric acids. Working closely with your nutrition-

(Continued on page 29)

(Continued from Immature and Frosted Silage, page 28)

ist will help you develop the most useful rations with immature corn silage.

For additional information contact UVM Extension Agronomist, Heather Darby at 802-524-6501.

Table 1. Three year average of whole plant DM, DM yield, CP, ADF, NDF, and digestibility for four 85d RM hybrids harvested at five stages of kernel maturity.

Maturity stage	DM	DM yield	CP	ADF	NDF	Digestibility units
	%	tons/acre	%			
Soft dough	24	5.4	10.3	27.2	52.7	77.1
Early dent	27	5.6	9.9	24.3	48.0	79.0
½ milkline	34	6.3	9.2	22.8	45.1	80.0
¾ milkline	37	6.4	8.9	23.8	47.3	79.6
No milkline	40	6.3	8.4	24.0	47.3	78.6

Adapted from Wiersma, D.W., P.R. Carter, K.A. Albrecht and J. G. Coors. 1993. J. Prod. Agric. Vol. 6, no. 1, p. 94-99.