Immature Corn Silage

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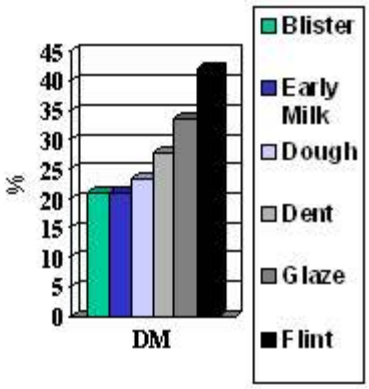
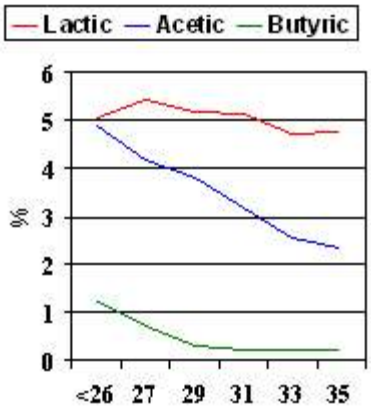
Immature Corn Silage is Wet
Fermentation may differ

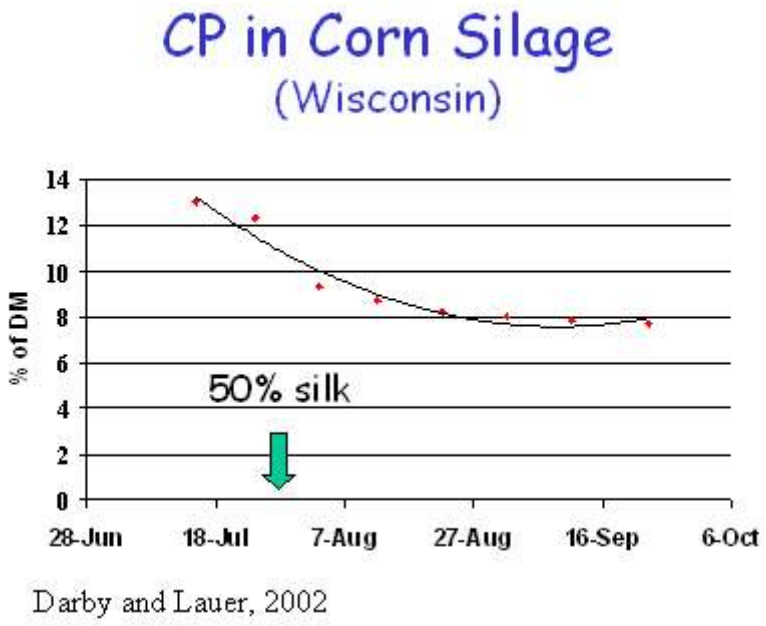


Johnson and McClure, 1968



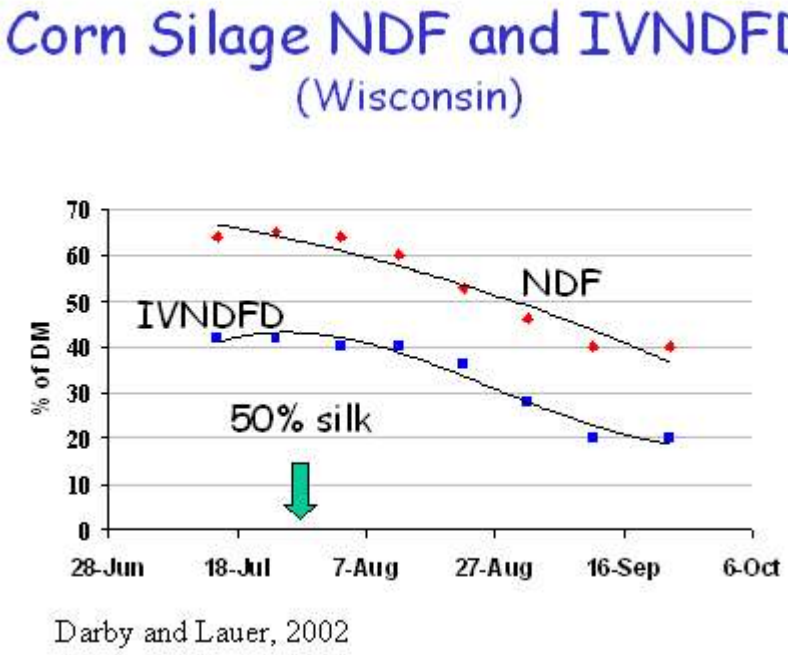
Ward, 2000

The figure on the left side shows dry matter concentrations of corn silage harvested at various stages of maturity. The blister stage occurred approximately 93 days after planting and the glaze stage occurred 128 days after planting. The figure on the right side is from a different source and shows the relationship between DM concentration of corn silage and fermentation acids. Note the very high concentrations of acetic acid and butyric acid in wet silage. Silages with high acid concentrations can reduce intake by dairy cows.

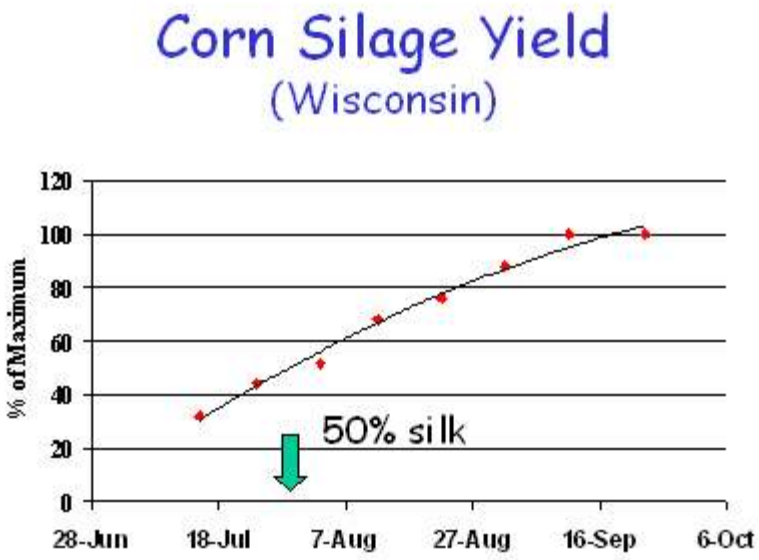


Darby and Lauer, 2002

This figure shows changes in crude protein concentration as corn plants mature. The experiment was conducted in Wisconsin so the dates may not correspond with Ohio. In this experiment 50% of the plants were in silk on approximately July 27. On average, CP concentration of immature corn silage should be slightly higher than normal corn silage.

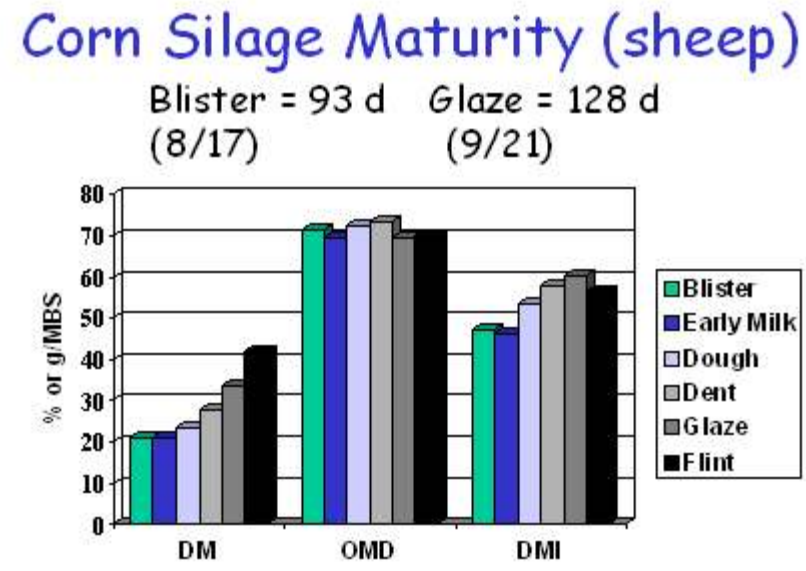


This figure shows changes in NDF concentration and in vitro NDF digestibility (IVNDFD) in corn plants as they mature. Note that immature corn plants have high fiber concentrations but the fiber is very digestible. As the plant mature, grain develops and dilutes out the fiber causing its concentration to decrease. The decrease in fiber digestibility is caused by increased lignification of the plant as it matures. Forages with high NDF concentrations often decrease intake by dairy cows and increased IVNDFD is related to increased intake. In the case of immature corn silage, the higher fiber digestibility probably compensates for the higher NDF concentration. The high fiber concentration probably does not affect intake greatly in this case.



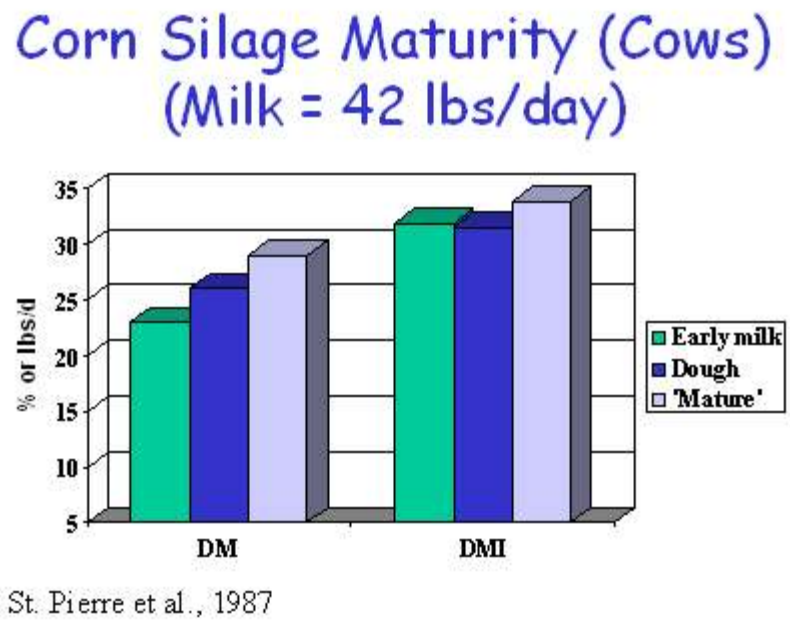
Darby and Lauer, 2002

Dry matter yield is much lower for immature corn silage than normal corn silage. To meet inventory needs, more acres of immature corn silage will need to be harvested than normal corn silage.



Johnson and McClure, 1968

This figure shows how corn silage maturity affects organic matter digestibility (OMD) and dry matter intake (DMI) by sheep. OMD is similar to TDN. The first set of bars shows the DM concentration of the silage. Note that the energy value (OMD) is not affected by maturity even though immature silage has more NDF. Most importantly note the depressed intake when sheep were fed immature corn silage. Compared to normal corn silage, sheep consumed about 25% less DM when the silage was chopped in the early milk stage. In the experiment corn silage made up the entire diet.



This figure shows the effect of corn silage maturity on dry matter intake by low producing dairy cows. The first set of bars is the DM concentration of the silage. Dairy cows consumed about 7% less of a diet based on immature corn silage compared with normal corn silage. The diets were about 65% corn silage in this experiment.

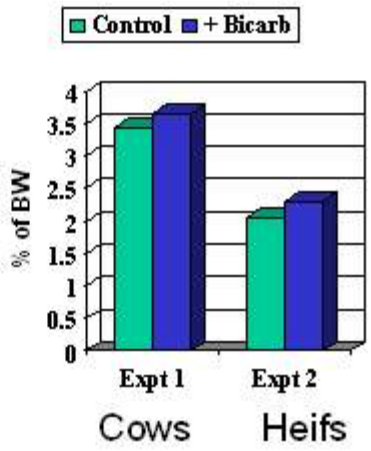
Silage pH and Intake

Expt 1

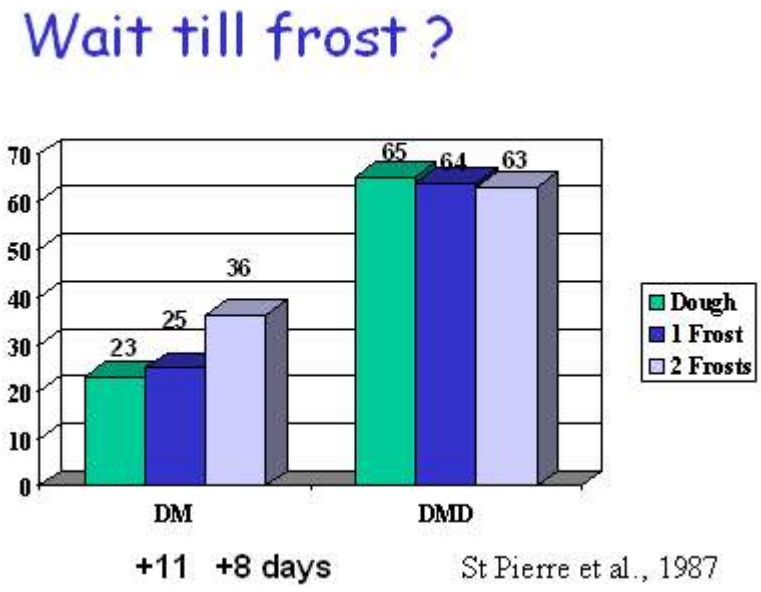
- Control pH 3.6
- Cont + bicarb = 5.4
- Bicarb@4% (DM)

Expt 2

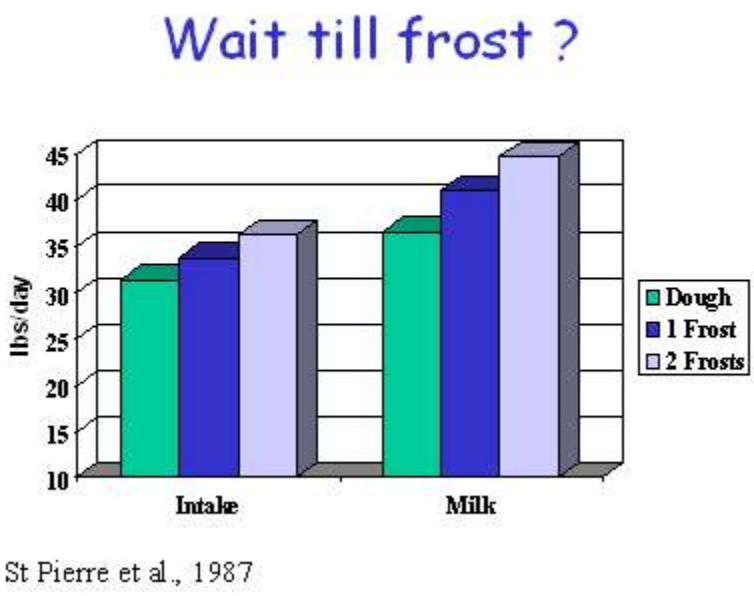
- Control pH = 3.7
- +Bicarb = 5.1
- Bicarb@5.5% (DM)



The main reason for low DM intake by cows fed immature corn silage is its fermentation (high acids, high acetic acid, potentially high butyric acid). Some experiments have shown that neutralizing the acid with sodium bicarbonate before feeding can increase intake. In these experiments, corn silage (pH approximately 3.6) was mixed with 4 to 5.5% (DM basis or about 25 lbs/ton as fed). The silage mixture sat for 15-30 minutes, then the rest of the TMR was made and the diet was fed to the cows. In both experiments (one with dairy cows and one with dairy heifers), the neutralized corn silage promoted higher intake. If you have immature corn silage and intake is a problem, adding sodium bicarbonate prior to feeding may help increase intake.



This figure shows the effect of frost on dry matter concentration of corn silage and on dry matter digestibility (DMD, similar to TDN). In this experiment one frost did not greatly change DM concentration but plants dried very quickly following the second frost. Frost had little effect on DM digestibility meaning it did not reduce the energy value of corn silage. Frost can help speed drying of corn plants in the field but the response is variable. Dry matter concentration of corn plants should be measured frequently following a frost and the plants should be chopped as soon as the DM concentration is approximately 32-35%.



This figure shows production data when cows are fed frosted silage (same silage as in the previous slide). Note that as the DM concentration of the silage increased (see previous slide) both intake and milk production increased substantially. Frost can improve feeding value by helping to dry the corn plants to an acceptable moisture content.

Storing Immature corn silage

- Mixing with normal corn silage in the silo
  - -Not a good idea-it turns good silage into mediocre silage
- Best option, store immature separately from normal silage (bags?)
  - -feed immature silage to heifers, dry cows, low producing cows
  - -blend with good stuff at known rate

If at all possible, immature corn silage should be stored in a separate structure , not with normal corn silage. The mixed silage is variable in composition making diet formulation difficult. It may also cause fermentation problems in all the silage. Immature silage stored in a separate structure (such as a bag) can be sampled and analyzed and diets can be formulated. Because intake is not as high for heifers and dry cows, feeding immature corn silage to those animals may not have detrimental affects. Remember to have the immature corn silage sampled and analyzed-its nutrient composition will differ from normal corn silage.

If you are considering purchasing immature corn for silage, it is not worth as much as normal corn silage because of the potential for lower intakes and lower milk production. If you could purchase normal corn silage for $25/ton (35% dry matter), immature corn silage would be worth substantially less. First you have to convert prices to a dry matter basis. Normal corn silage at $25/ton at 35% DM is worth 25/0.35 = $71/ton of DM. Immature corn silage because of intake problems is worth about 85% as much as normal corn silage. Therefore on a dry basis immature corn silage is worth 71 x 0.85 = $60/ton of DM. Assuming the immature corn silage was 26% DM, it would be worth 60 x 0.26 = $15.60/ton as-fed. **Note: Do not interpret this to mean you should pay $15.60/ton for all immature corn silage, its actual value depends on what normal corn silage is worth and its dry matter concentration.**