What Corn Silage Harvest Moisture will Maximize Milk Yield?

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Summary

- As corn plants mature and increase in dry matter, starch displaces sugar, fiber, and ash.
- Compared with corn silage harvested at the optimum DM content, corn silage at 30 percent DM resulted in 5 to 13 percent less milk per ton and 7 to 25 percent less milk per acre.
- Hybrid ranking for milk per ton and milk per acre varied with harvest dry matter.
- Differences in projected milk yields were due largely to starch content and starch yield.

Introduction

For corn silage, corn plants should be harvested when sufficiently dry to avoid loss of silage fluids but still wet enough to pack and store well. For maximum whole plant digestibility, harvest at 30 percent dry matter was a common recommendation due to concerns about reduced fiber digestibility of plants that are more mature. This standard recommendation preceded the introduction of technology traits that vastly improved late-season plant health and the development of modern hybrids that yield more starch and dry matter at later stages of maturity. Digestibility of NDF does not decrease markedly with corn plant maturation because when harvested for silage, plants are quite immature as compared with forages harvested as hay. Objectives of this trial were to determine effects of plant maturity (DM) on nutrient composition and on projected milk per acre and milk per ton.

Experimental Procedures

Six commercial Pioneer corn hybrids (105 to 116 day CRM) were planted on May 12, 2009 near Normal, IL. Plants (replicate sets of 5 plants per harvest date) from each hybrid were harvested 7 inches above ground level twice each week starting August 10 until DM content for hybrids reached 50 percent (October 12). Sets of harvested plants were chopped, sampled, dried, and assayed via calibrated NIR analysis. By regression analysis from 25 to 45 percent DM, effect of plant DM on nutrient composition averaged across hybrids was examined. Using linear, quadratic, and cubic regression analysis, effects of harvest DM on milk yield per ton and per acre were calculated (based on Milk 2006 equations) for each hybrid and date. Finally, stepwise regression was used to determine the relative importance of specific nutrients and measurements on milk per ton and milk per acre.

Results and Discussion

For each 1 percent increase in harvest DM, the percentage of starch in DM increased by 2 percent ($P < 0.01$) while decreases ($P < 0.01$) were detected for NDF (1.1 percent), sugars (0.7 percent), and ash (0.1 percent; Figure 1). Changes paralleled those observed for these same hybrids in the 2008 report. Because hybrids differed in nutrient composition on various harvest dates, milk per acre and milk per ton were altered by harvest DM, and ranking of hybrids changed with harvest date (Figure 2). For these hybrids, calculated milk per ton (kernel processed corn silage) was maximized at plant DM between 33 and 36 percent with maximum milk per ton being 5 to 13 percent greater and maximum milk per acre being 7 to 25 percent greater than at 30 percent DM. Hybrid ranking at 35 percent DM differed from that at 30 percent DM (R2 = 0.62; NS). Across hybrids and harvest dates, milk per ton depended primarily on starch content and NDFD (partial R2 = 0.82; 0.06) while milk per ton varied with starch and protein yields (partial R2 = 0.86; 0.07).

Moisture at harvest impacts corn silage quality and milk/acre

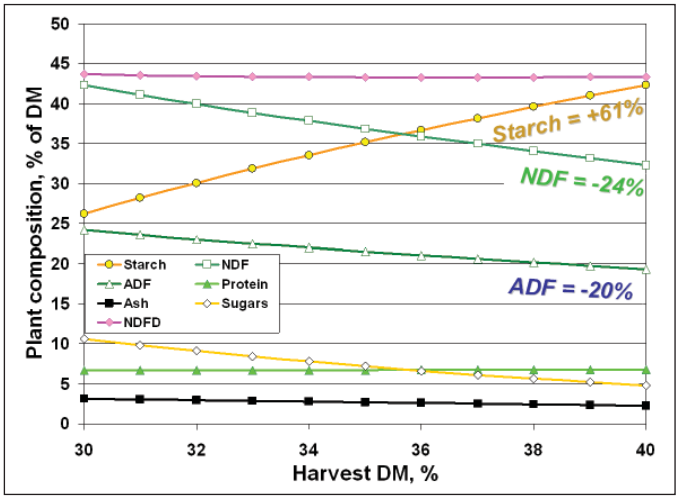

Figure 1. Nutrient composition of corn plants at various harvest dry matter contents averaged across six hybrids.

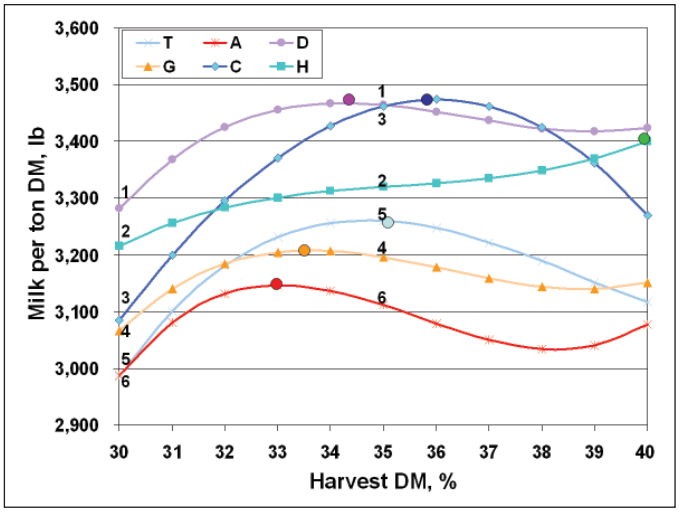

Figure 2. Milk per ton calculated from composition of six hybrids harvested at various DM contents. Circles are maximum points; numbers represent numeric ranking.