

BEEF CATTLE RESEARCH UPDATE

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The Effect of Delayed Corn Silage Harvest on Steer Performance in Growing and Finishing Diets

Corn silage should typically be harvested between 65 to 70% moisture (30 to 35% dry matter, DM) for horizontal bunker silos. The kernel milk line (represents starch content of the grain) is a common visual tool used to determine kernel moisture content (Figure 1). One examines the milk line by breaking a cob in half and looking at the kernels. After denting (0% milk line), a whitish line can be seen on the kernels. This line is where the solid and liquid parts of the kernel are separated while maturing and drying. This line will progress from the outer edge of the kernel towards the cob. When this milk line reaches the cob (100% milk line), a black layer will occur. The traditional recommendation (considered optimum for both yield and quality) has been to harvest corn silage when the milk line is between one-half and three-fourths down the kernel (moisture content of 60 to 70%).

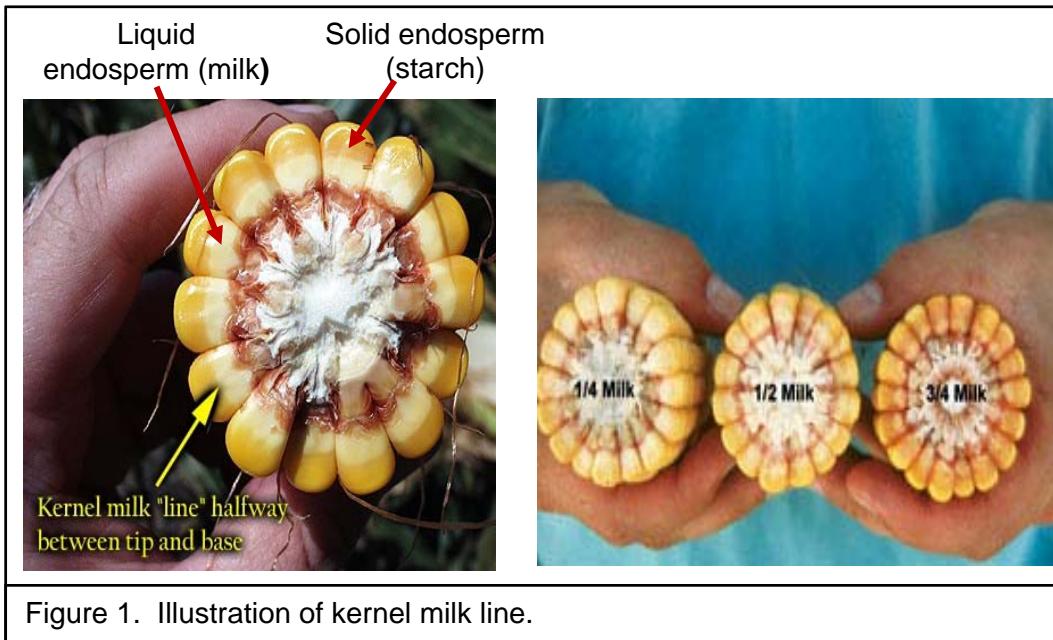


Figure 1. Illustration of kernel milk line.

University of Nebraska researchers serially harvested corn plots over two years (2013 and 2014) to evaluate changes in nutrient content, digestibility, and yield as plants matured from half-milk line through black layer (100% milk line).¹ The effects of harvest date on corn silage yield and nutritive characteristics are shown in Table 1. Percent grain increased linearly as maturity increased ($P < 0.01$ and averaged 52% grain at black layer). Silage yield increased quadratically as maturity increased ($P = 0.01$), peaking at black layer (12.6 tons/acre). Silage dry matter (DM) also increased linearly as maturity increased ($P < 0.01$), increasing slowly until approximately a week before black layer; then DM increased at a faster rate. Silage DM was 33 to 38% at 1 to 2 weeks prior to black layer when traditionally cut for silage and 42% at black layer. The percent digestible DM (entire plant with grain) increased quadratically as maturity increased with no change from 35 to 44% DM ($P < 0.01$). Since silage yield increased up to black layer (42% DM), the cost per ton of DM would be least at black layer. These researchers also noted that hauling dryer silage should decrease harvest, transport, and packing costs.

Table 1. Effects of silage harvest date on corn silage yield and nutrient characteristics.

	Weeks from Black Layer								P-value	
	-4	-3	-2	-1	0	1	2	3	Linear ^a	Quad ^b
% Grain	48.8	45.2	48.9	50.9	52.3	53.5	55.2	59.4	< 0.01	0.29
Silage Yield, DM tons/acre	10.28	10.49	10.65	11.22	12.59	11.95	10.33	9.07	0.73	0.01
Silage DM, %	33.4	32.2	33.4	38.1	42.2	43.3	49.1	59.0	< 0.01	0.01
Digestible DM, % ^c	72.7	75.8	76.9	77.6	77.4	77.7	74.6	70.6	0.50	0.01

^aP-value for linear response to maturity (weeks from black layer).

^bP-value for quadratic response to maturity (weeks from black layer).

^cEntire plant with grain

Adapted from Row et al., 2016

University of Nebraska research also evaluated the effect of delaying corn silage harvest on steer performance in growing and finishing diets in two experiments.^{2,3} In these experiments, corn silage was either harvested to mimic traditional corn silage harvested at ¾ milk line (37% DM) or harvested about 2 weeks later coinciding with black layer formation (43% DM). The silage was stored in sealed Ag bags.

In the growing experiment, 60 crossbred calves (597 lb initial weight) were individually fed 78 days using a Calan gate system. As the DM content of the silage increased from 37 to 43%, ending body weight decreased (846 vs. 826 lb; P = 0.04) due to reduced average daily gain (3.19 vs. 2.93 lb/day; P = 0.01), which also increased the feed to gain ratio (5.63 vs. 6.11; P < 0.01). In the finishing experiment, 180 crossbred yearling steer (943 lb initial weight) were used in a 108 day feeding trial. As the DM content of the silage increased from 37 to 43%, no differences in feedlot performance or carcass characteristics were observed. However, corn silage yield was greater for the 43% DM silage vs. the 37% DM silage (10.07 vs. 9.55 DM tons/acre, P < 0.01).

The results of these Nebraska trials suggest that delaying corn harvest could be economical due to increased DM tons harvested, reduced handling costs, and no negative impacts on finishing performance. However, the packing and storage of high DM corn silage could be a concern with traditional bunker silage since dryer corn does not pack well, producing more air pockets during packing. This may lead to poor fermentation causing higher DM losses (shrinkage), greater spoilage and poor bunk life.

¹ Row, C. A., R. G. Bondurant, A. K. Watson, J. L. Harding, J. C. MacDonald, T. J. Klopfenstein, and G. E. Erickson. 2016. Effect of Corn Plant Maturity on Yield and Nutrient Quality of Corn Plants, 2- Year Summary. Nebraska Beef Cattle Report MP103: 79-80.

² Hilscher, F. H., D. B. Burken, C. J. Bittner, J. L. Gramkow, R. G. Bondurant, T. J. Klopfenstein, and G. E. Erickson. 2016. The effect of delayed corn silage harvest on steer performance in growing and finishing diets. In: 2016 Plains Nutrition Council Spring Conference, San Antonio, TX. p. 109 (Abstr.).

³ Hilscher, F. H., D. B. Burken, C. J. Bittner, J. L. Harding, T. J. Klopfenstein, and G. E. Erickson. 2016. The Effect of Delayed Corn Silage Harvest on Corn Silage Yield and Finishing Performance in Yearling Steers. Nebraska Beef Cattle Report MP103: 146-148.