

Corn Silage For Dairy Cattle

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Corn silage is a valuable feed in dairy rations. It is widely used because it:

- has unexcelled energy yield per acre
- is highly digestible
- is relatively easy to harvest, store and handle
- and adapts readily to mechanical handling systems.

However, some dairymen get less than full value from corn silage. Most common problems are harvesting at the wrong time and failing to supplement correctly when silage is fed.

Maturity and Dry Matter

Good corn silage starts with the variety you plant. Select a variety that will mature to the hard dent stage (less than 70 percent moisture) in your area at the time you want to harvest. This is important because the actual feed in corn silage depends on maturity at harvest.

The two varieties in Table 1 were fertilized

Table 1. Effect of maturity on dry matter and harvesting costs of corn silage.

	Desirable maturity	Immature by 10 days
Green fodder per acre (lb.)	35,764	43,283
Difference		+7,519
Percent moisture	63.1	71.7
Water harvested, hauled (lb.)	22,567	31,034
Difference		+ 8,677
Feed harvested, hauled (lb.)	13,197	12,249
Difference	+ 948	
Harvest cost per acre (\$2 per ton)	\$35.76	\$43.28
Difference		+\$ 7.52

alike and grown in the same field. Both produced good quality silage. The immature corn, harvested at 72 percent moisture, yielded 3½ tons more fodder but the corn at 63 percent moisture yielded half a ton per acre more dry matter.

Green-weight yields can be misleading. Yield of dry matter per acre tells you how much the corn silage is worth as a feed.

Maturity and Digestibility

As the corn plant matures, the ratio of ear to leaves and stalk increases (Table 2). At the milk stage of maturity, the corn plant is approximately 22 percent dry matter. It then has 2.5 bushels of ear corn and 346 pounds of leaves and stalks in each ton of fodder. When the corn matures to 32 percent dry matter, each ton of fodder has 5.7 bushels of ear corn and 350 pounds of leaves and stalks.

Table 2. Ear and leaf-stalk content in one ton of corn silage at various stages of development.¹

Dry Matter of Forage %	Ears ² bu.	Stalks & Leaves ³ lb.	Dry Matter of Forage %	Ears ² bu.	Stalks & Leaves ³ lb.
15	0.2	342	24	3.1	347
16	0.5	343	25	3.4	347
17	0.8	343	26	3.8	348
18	1.1	344	27	4.1	348
19	1.5	344	28	4.4	348
20	1.8	345	29	4.8	349
21	2.1	345	30	5.1	349
22	2.5	346	31	5.4	350
23	2.8	346	32	5.7	350

¹Nevens, J. Dairy Science, 37:1088-1093, 1954

²15% moisture basis; 70 lb. of ears/bushel.

³15% moisture basis

Table 3. Consumption and energy of corn silage fed at three different stages of maturity.

	Dry Matter		
	25%	30%	33%
Consumption, lb.	116	107	101
Dry matter, lb.	29	32	33
Total energy from corn silage consumed, therms	15.1	17.1	20.2
Energy needed for body maintenance of 1500 lb. dairy cow, therms	8.5	8.5	8.5
Energy left for production, therms	6.6	8.6	11.7

Digestibility of dry matter in corn silage also increases as the corn matures up to the level of 35 percent dry matter. The reason is the increased amount of grain in the silage. At 35 percent dry matter, the silage contains the maximum amount of grain and further increases in dry matter result only from the plant losing moisture.

What does this mean in feeding silage? Silage harvested at the right stage of maturity produces more usable energy. A cow weighing 1,500 pounds will consume more high-moisture silage: 116 pounds at the 25 percent dry matter level compared with the 101 pounds at the 33 percent level (Table 3). But she will obtain 5 more therms of energy from the silage at the 33 percent level.

Supplementing Corn Silage

Corn silage is low in protein and should be supplemented as follows:

1. Feed a 12 to 14 percent protein grain ration when corn silage makes up less than half of the forage portion of the dairy ration on a dry matter basis, and alfalfa makes up the rest of the forage. If the hay contains any grass, figure the grass as part of the corn silage portion.

2. Feed a 15 to 17 percent protein grain ration when corn silage makes up one-half to three-fourths of the forage.
3. Feed an 18 to 20 percent protein grain ration when corn silage is the only forage fed.
4. Feed one-half pound of cottonseed meal (44 percent) per head to dry cows when corn silage replaces more than three-fourths of the alfalfa hay. If lesser amounts of corn silage are fed, supplement with the regular grain ration.

You can add 10 pounds of urea per ton of corn silage at the time of ensiling or as you feed it. The urea will replace 2 percent of the protein supplemented by the rations above — in Ration No. 1, for example, feed a 10 to 12 percent protein grain supplement if urea is added to the silage. Dry cows and heifers need no additional protein if you feed them corn silage with urea.

Caution: Do not add urea to corn silage and to the grain ration at the same time without some careful calculations. Urea should not make up more than one-third of the protein in the total ration.

Corn silage is low in calcium, medium in phosphorus. All grain rations should contain a 1 percent iodized or trace-mineralized salt. These minerals should also be made available free choice.

Fertilizing Corn for Silage

Fertilizer has more influence on total yield than on composition of silage. Typical composition of corn silage is shown in Table 4. Note that yield of green forage and dry matter is increased at the higher fertilizer rate but other constituents remain fairly constant. The higher rate of nitrogen slows maturity slightly, as indicated by the lower percentage of dry matter.

Use a soil test as a guide to the corn fertilization program that will produce maximum yield. Nitrogen and phosphorus are needed throughout southern Idaho. Potassium, zinc and other nutrients may be needed in your area.

Table 4. Constituents of corn silage under two fertilization rates.¹

Fertilization			Green fodder lb./A	Dry Matter		Crude protein %	Crude fiber %	Ash %	N-free extract %	Energy per lb. therms
N	P	K		lb.	%					
56	48	48	16,470	4,220	38.2	5.6	33.1	3.2	56.1	4.6
112	96	96	20,930	5,360	36.2	6.6	32.8	3.1	55.5	4.6

¹Alexander, J. Animal Science, 24:5-8, 1963.

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