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## G78-395 Feeding Corn and Sorghum Silages to Beef Cattle

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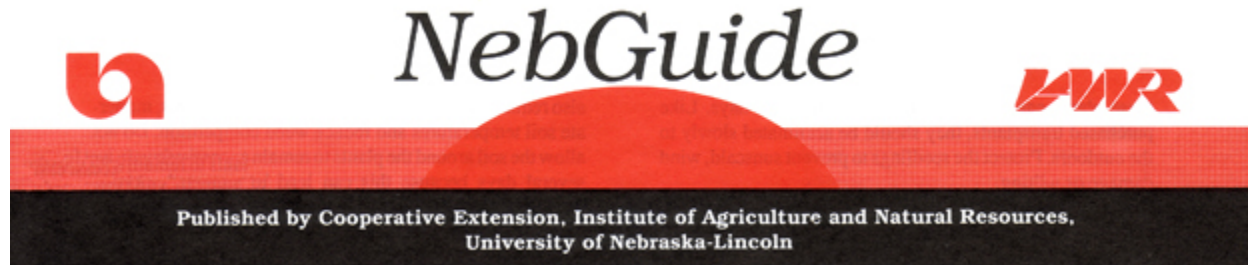
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# Feeding Corn and Sorghum Silages to Beef Cattle

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Corn and sorghum silages are versatile feeds that can be supplemented so that they are satisfactory for part of most growing and finishing rations. Harvesting corn as silage and planting forage sorghums for silage have the advantage that they maximize beef production per acre compared to harvesting these crops by other methods and other cropping programs. Another important advantage is that harvesting, storage and feeding can be completely mechanized.

However, as the costs of machinery, fuel, and labor have increased, the cost of harvesting silage has increased more rapidly than harvesting as grain.

## Nutritional Qualities of Corn Silage

### *Energy*

Corn silage is a medium energy feed. It is basically similar to a 50% grain:50% hay ration, since good silage normally contains 50 to 55% grain dry matter. Its energy content makes it particularly desirable as the major feed-stuff in rations for growing calves and as the roughage for finishing cattle. It normally contains more energy than desirable for dry cows or average beef cows in lactation, and amounts fed to these should be limited to their approximate energy needs.

Maturity of corn appears to have a minor effect on silage energy value (dry basis) if harvested beyond the milk stage. The stalk of the immature corn has higher digestibility than stalks of more mature corn, largely offsetting the reduced percentage of dry matter from grain. The major disadvantages of harvesting at an immature stage are: 1) The yield of dry matter per acre is reduced; 2) the silage is high in moisture, which changes the acids produced in fermentation and may decrease palatability; and 3) higher fermentation and seepage losses occur, especially in upright silos.

Energy content of corn silage raised under drought conditions is usually reduced if the growth of the stalks is stopped at or near tasseling. Corn that does not fully pollinate but grows reasonably well following tasseling may have nearly as much energy value as regular corn silage.

Varieties bred for high silage yields and thickly planted crops usually have a low grain-to-forage ratio and a lowered energy content compared to regular corn silage.

Corn severely damaged by hail may also have a lowered energy content, especially if damaged after the late milk stage.

### ***Protein***

Corn silage usually contains 7.5 to 9% crude protein (dry matter basis). Immature and drought damaged corn are usually higher in protein content (up to 11 or 12%). Low yields tend to be associated with above average protein content, and high yields with below average protein. For this reason, protein analyses of silage are useful if silage is the major feed in the ration.

### ***Minerals***

Corn silage will usually be deficient in calcium and phosphorus for 300- to 500-lb. calves expected to gain 1 lb. or more daily, and for 500- to 700-lb. calves expected to gain 1.5 lbs. or more daily. Sulfur may also be borderline if non-protein nitrogen is used to provide the supplemental protein equivalent for an all-silage forage ration.

### ***Vitamins***

The carotene (pro-vitamin A) content of corn silage can not be depended on to meet vitamin A needs. Therefore, supplemental vitamin A should be routinely provided to meet the entire needs of the animals fed. Supplemental vitamins other than vitamin A are not needed in the ration of normal, healthy beef animals except in starting or receiving rations.

Corn silage harvested after the grain is 50% dented usually has adequate vitamin D for most beef cattle. Cattle fed in outside lots seldom need vitamin D in their ration because the sun's rays activate vitamin D production within their bodies.

### ***Nitrates***

Nitrates may be high in immature corn harvested after drought, hail, or insect damage. During silage fermentation up to 60% of the nitrate is reduced to nitrous oxide, which is dissipated into the atmosphere or converted to ammonia that may be used by rumen microorganisms in the formation of protein. Immature or other silages suspected of being high in nitrate should be analyzed for nitrate content before feeding if they are to be fed as the major part of the ration. If nitrate is above 0.21% nitrate nitrogen, the ration should be formulated and fed with caution to minimize the possibility of nitrate toxicity (see [\*NebGuide G74-170, Nitrates in Livestock Feeding\*](#)).

## **Nutritional Quality of Sorghum Silages**

Forage sorghum silages are usually 10 to 20% lower in energy value than corn silage (dry basis). This occurs primarily because of a lower grain-to-roughage ratio and a larger percentage of the grain passes through the animal undigested. Also, because it is usually higher in moisture, the fermentation products

produced tend to reduce intake when silage is the major feedstuff in the ration. Protein and phosphorus content is quite similar to corn silage and calcium is somewhat higher.

Grain sorghum is occasionally used for silage. This is usually the result of some type of emergency, and the silage may not be typical of a normal high yielding grain sorghum. Grain sorghum silage normally would have a high grain-to-forage ratio and be as high or higher in energy than corn silage. However, 25-30% or perhaps more of the grain would pass through cattle undigested if harvested when most of the berries are ripe. Rolling the silage just before feeding may improve feeding value by as much as 10%. Harvesting the crop when most of the grain is in the hard dough stage reduces the loss in digestibility to some extent, and may be preferable to letting the crop get ripe and then grinding it.

## **Feeding Programs**

### ***Growing Cattle***

Corn silage can be used as the major feedstuff for growing steer calves from 300 to 700 lbs. on programs designed for daily gains from 1 to 2 lbs. Heifer calves usually gain 0.2 to 0.3 lb. daily less than their steer mates on similar rations. Adding an ionophore to the ration may increase gains 0.1 to 0.2 lb. daily. Feeding urea may reduce daily gains by 0.2 to 0.3 lb. on calves weighing under 550 lbs. unless it is included with a high bypass protein supplement.

Supplemental protein will be needed in all weight groups for 1.5 lbs. or more daily gain as shown in *Table I*. For calves under 400 lbs., this could be provided by 1) a commercial supplement containing either a plant protein source only or a high bypass protein in combination with urea, or 2) alfalfa hay with some grain fed as an energy source to compensate for the lower energy in alfalfa. For cattle 400 lbs. and up, supplemental protein needs can be met by alfalfa hay, since the energy in corn silage is above needs for 1.5 lbs. daily gain. To produce gains greater than 1.5 lbs. for cattle weighing 400 to 700 lbs., supplemental protein should be increased to provide a ration containing 11 to 11.5% crude protein. No additional grain should be needed with most corn silages that are properly made from regular grain varieties. Forage sorghum silage is lower in energy than corn silage, thus additional gain should be fed to get equal gain. For gains of 1.5 lbs. per head daily, 2 to 3 lbs. of grain per head should be included daily along with protein, mineral and vitamin supplementation. For gains of 1.7 to 2.0 lbs., about 4 to 5 lbs. of grain will be needed with forage sorghum silage.

Calcium and phosphorus content of corn and sorghum silages are below requirements for most of the growing period. Thus, calcium and phosphorus should be included in the supplement or added to the complete ration.

If alfalfa is used to supply needed protein, a commercial mineral fed free choice should supply adequate calcium and phosphorus for calves. Although trace minerals are not likely to be deficient, they may be included in the protein supplement, commercial mineral, or trace mineralized salt.

Vitamin A should be included in the ration at the rate of ,000 IOU per head daily. This can be carried in the protein supplement or added to the ration as the equivalent in vitamin A concentrate weekly or biweekly.

Two frequent concerns of silage feeders are the supposed needs for supplemental grain feeding (especially during cold weather) and feeding some dry hay along with silage.

As indicated, corn silage made properly from a regular grain variety has enough energy to produce up to

1.7 to 2.0 lbs. daily gain on steers. Additional grain will increase gains, but will be less efficiently used than if held and fed after the cattle are started on a finishing ration.

**Table I. Comparison of nutrient recommendations for medium to large frame steer and heifer calves gaining 1.5 to 2 lbs. daily and nutrients supplied by corn and sorghum silage (dry basis).**

	<b>Total Protein (%)</b>	<b>NE<sub>m</sub> Mcal /cwt</b>	<b>NE<sub>g</sub> Mcal /cwt</b>	<b>TDN (%)</b>	<b>Ca (%)</b>	<b>P (%)</b>
	Nutrient Recommended - 2.0 lbs Daily Gain					
Calf Weight						
300-400 lbs.	13.0	78	50	72	.60	.35
400-500 lbs.	12.0	76	48	70	.50	.30
500-700 lbs.	11.5	71	45	68	.50	.30
	Nutrients Supplied by Silage					
Corn Silage	8.0	74	47	70	.27	.20
Forage Sorghum Silage	8.1	62	38	58	.35	.20

There is little need to add dry roughage to a high silage ration. Dry matter intake, and consequently rate of gain, tends to be lower for cattle fed high moisture silage in growing rations. But, this appears to be due to the moisture effect on fermentation rather than excess water intake from the feed. With high moisture corn silage, alfalfa hay would be preferred as a supplemental protein source over high moisture alfalfa silage, which might contribute to a further reduction in intake. If you're feeding a wet silage, adding grain to reach the desired energy intake may be the most economical method of increasing gains to the desired level. On the other hand, slower gains during the growing period may result in most economical total gain to marketing since compensatory gain usually occurs during the following finishing period.

Silage can be used for a large part of the growing ration when gains as low as 1 lb. per day or less are acceptable. To decrease gains, feed more hay or lower quality roughage. If hay is not available, the ration can be fed in limited amounts or the amount of protein supplement fed can be decreased. Corn silage without protein supplement should produce about 1 lb. of steer gain daily. Minerals can be fed by providing a mineral supplement, free choice. The equivalent of about 5-10,000 IU vitamin A per head daily should be fed along with the silage. For heifers to gain 1 lb. per head daily, about 0.5 lb. of 40% supplement or its equivalent should be fed daily.

### ***Finishing***

Corn silage can be used to provide the roughage needed in high concentrate finishing rations or, if time is not an overriding factor, cattle can be finished on a high corn silage ration. Steers gaining about 1.7-2.0 lbs. and heifers gaining about 1.5-1.8 lbs. per head daily finish and reach slaughter condition and weight near that of cattle fed a high concentrate ration.

In the finishing program, "in between" rations or rations with medium levels of grain and silage tend to be less efficient than either a high silage ration or a high grain ration, or programs involving a high silage phase followed by a high grain feeding period. The best explanation for this is that starch depresses fiber digestion, resulting in forage being poorly utilized when moderately high roughage

levels are fed.

For high grain finishing rations, we suggest a minimum of approximately 10% silage dry matter in the ration. The ration should contain about 11.5% protein, 0.5-0.7% calcium and 0.3% phosphorus. After the cattle are well adjusted to the finishing ration and weigh over 800 to 850 lbs., the protein level can be reduced to 10.5%.

### ***Bred Cows***

Both corn and sorghum silages contain more energy than needed by bred heifers or cows. They can be included in rations if total feed intake is restricted. Otherwise, cows and heifers may put on more fat than desirable.

When restricted amounts of silage are fed to meet energy needs of the bred cow, only a limited amount of protein supplement should be necessary. About 20,000 IU per head daily of vitamin A should be provided the last 60 to 70 days before calving. A high phosphorus mineral supplement (10-15% phosphorus) should be provided, free choice. Calcium usually will be adequate.

### ***Cows Nursing Calves***

Corn or sorghum silages are suitable feeds for providing supplemental energy for cows and heifers nursing calves during the first few months of lactation. Amounts to be fed will be influenced by the kind and amount of other forage provided. If corn or sorghum silage is the only forage available, the amount fed should be restricted to the approximate needs of cows to avoid excess condition on cows. When this feeding program is followed, protein, calcium, phosphorus and vitamin A all need to be included in the supplement program at adequate levels.

When the ground is relatively dry or frozen, silages can be fed on clean, sodded ground satisfactorily. Bunks of some type are almost a necessity for feeding silage during wet weather.

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