

Pricing Forage in the Field

Questions often arise about how to arrive at a fair price for standing crops such as corn silage, oats, hay, and cornstalks. Although there are no widely quoted market prices for these crops, they can be valued according to their relative feed value and compared to other crops that have a known market price, such as corn grain or hay.

Corn Silage

Corn silage can be quickly valued according to the price of corn grain. Taking into account the value of the grain, the extra fertilizer cost incurred and the harvesting costs saved, a ton of corn silage in the field is usually worth 8-10 times as much as a bushel of corn, depending on the potential grain yield. Silage from a field that would yield above 200 bushels per acre can be valued at 10 times the corn price. But if the potential yield is less than 100 bushels per acre, the silage should be valued at only eight times the corn price (see Example 1).

These ratios assume silage is harvested at 65 percent moisture. To adjust for other moisture levels, subtract the actual moisture level from 100, divide by 35, then multiply by the estimated value for 65 percent moisture silage (see Example 2).

Corn silage that has already been harvested and stored is worth more, naturally, typically 10-12 times the price of a bushel of corn. Use the local harvest-time price as a guide for corn prices.

Example 2

Silage moisture level	70%
Silage dry matter level	100% - 70% = 30%
Silage value at 65%	\$28.35 per ton
Silage value at 70%	$\$28.35 \times (30 / 35) =$ \$24.30 per ton

The quantity of silage harvested can be estimated by:

- weighing several loads and counting the total number of loads,
- calculating the storage capacity of the silo in which it is stored (see *AgDM Information File and Decision Tool C6-82, Estimated Storage Capacity for Grains, Forages, and Liquids*, www.extension.iastate.edu/agdm/wholefarm/pdf/c6-82.pdf), or
- comparing to the yield of corn grain in the same field.

As a rule of thumb, each bushel of 15 percent moisture corn is equivalent to .135 tons of 65 percent moisture corn silage. So, a field with an expected yield of 170 bushels per acre could be expected to produce $(170 \times .135) = 23$ tons of silage. Nearby fields can be used to estimate grain yield, or check strips can be left in the harvested field. Corn that is severely damaged by drought may produce more tons of silage per bushel of grain.

Example 1	Low Yield	Mid Yield	High Yield
Potential corn yield	75 bushels per acre	170 bushels per acre	225 bushels per acre
Expected corn price	\$3.15 per bushel	\$3.15 per bushel	\$3.15 per bushel
Value of standing silage, (\$ per ton)	$8 \times \$3.15 = \25.20	$9 \times \$3.15 = \28.35	$10 \times \$3.15 = \31.50
Yield of corn silage	10 tons per acre	23 tons per acre	30 tons per acre
Value of standing corn, (\$ per acre)	$10 \times \$25.20 = \252	$23 \times \$28.35 = \652	$30 \times \$31.50 = \945

An AgDM Decision Tool A1-65, **Silage Pricer – Corn Silage**, www.extension.iastate.edu/agdm/crops/xls/a1-65cornsilagepricer.xlsx, is available to compute a value for corn silage that considers additional factors.

Further Analysis

A more precise value can be placed on corn silage by considering the value of the corn stover part of the plant as well as the grain. The current market value of a ton of grass hay can be used as a measure of stover feed value. The overall value of a ton of silage will be a weighted average of the grain and forage components.

For normal yielding corn, the pounds of dry matter contained in grain and in stover can be considered to be equal. However, for lower yielding corn, such as may be the case in a drought year, the percent of the total dry matter contained in grain will be less, as low as 25-40 percent. This will tend to make the silage have a lower feed value.

Feed Value to the Buyer

The value of silage to the buyer can be estimated by the *value of the feed it replaces*. This will be the buyer's maximum bid price.

For example, if the grain yield would have been 170 bushels per acre and the price of corn is \$3.25 per bushel, the grain component of the silage is worth:

$$170 \text{ bu. / acre} \times \$3.25 / \text{bu.} = \$553 / \text{acre.}$$

The other 50 percent of the silage dry matter can be assumed to be stover, and can be valued as follows, assuming the current price of grass hay is \$100 per ton:

$$23 \text{ tons of silage} \times 50\% \text{ forage} \times (35\% \text{ silage dry matter} / 90\% \text{ hay dry matter}) = 4.47 \text{ tons of hay equivalent, at } \$100 / \text{ton} = \$447.$$

The combined feed value of the silage is:
 $\$553 \text{ (grain)} + \$447 \text{ (stover)} = \$1,000 / \text{acre,}$
 or $\$43.48 \text{ per ton of silage for a yield of } 23 \text{ tons per acre.}$



Photo courtesy of USDA.

If the buyer must harvest the silage, the feed value should be reduced by the cost of harvesting. For example, if the custom rate for chopping, hauling and storing silage is \$10.00 per ton, the value of the standing silage to the buyer is reduced to $\$43.48 - \$10.00 = \$33.48 \text{ per ton}$, or \$770 per acre. If the standing corn is a considerable distance away, additional costs may be incurred.

Opportunity Cost to the Seller

The seller gives up the *opportunity to sell the grain*. The value of the grain in the example was estimated to be \$553 per acre. In some cases the seller may have intended to sell some stover, as well, for feed or bedding, or to rent the stalk field, so this lost revenue would also have to be considered.

The seller may have *added fertilizer costs* the following year because the entire corn plant is removed for silage harvest, instead of just the grain. The extra cost of replacing fertility can be estimated using the values in Table 1.

Table 1. Estimated Removal Rates of P₂O₅ and K₂O

Crop	P ₂ O ₅	K ₂ O
Corn grain	.32 lb. per bushel	.22 lb. per bushel
Corn silage	3.5 lb. per ton	9.0 lb. per ton

Source: (Iowa State University Extension and Outreach Publication PM 1688)

Cost for grain:

.32 lb / bu. x 170 bu. x \$.34 / lb = \$18.50 (P_2O_5)
 .22 lb / bu. x 170 bu. x \$.25 / lb = \$ 9.35 (K_2O)
 Total \$27.85 per acre

Cost for silage:

3.5 lb / ton x 23 tons x \$.34 / lb = \$27.37 (P_2O_5)
 9.0 lb / ton x 23 tons x \$.25 / lb = \$51.75 (K_2O)
 Total \$79.12 per acre

The total extra fertilizer cost is \$79.12 - \$27.85 = \$51.27 per acre, or \$2.23 per ton of silage.

On the other hand, the seller saves the cost of harvesting, storing and drying the grain. Typical custom rates can be used to estimate these costs.

(\$35 for combining) + (\$.05 for hauling and storing x 170 bu.) + (\$.20 for drying x 170 bu.) = \$77.50 per acre

Thus, the net cost to the seller is \$553.00 + \$51.27 - \$77.50 = \$526.77 per acre, or \$22.90 per ton of silage. That is the minimum bid the seller can afford to accept.

Bargaining Range

The bargaining range between the seller and the buyer then is from \$22.90 to \$33.48 per ton of silage, or \$528 to \$770 per acre. Factors such as hauling distance, condition of the crop, quality of the silage, and the loss of residue coverage may also affect the value agreed on.

Silage in Storage

If the silage has already been harvested and stored, the cost of doing so should be added to the seller's minimum price and to the buyer's maximum price. For example, if a typical custom rate for harvesting, hauling, and storing corn silage is \$10.00 per ton, the seller's minimum price becomes \$32.90 and the buyer's maximum price becomes \$43.48.

Oats

Standing oats sold for silage can be priced relative to oats grain. As with corn silage, the ratio of the grain/silage price depends on several factors. Given limited data on oat silage pricing, historical analysis shows that the oat grain/silage ratio is roughly double that for corn (that is, if the corn ratio is eight, the oat ratio is around 16). Roughly one ton of 70 percent moisture oat silage can be harvested for each 12 bushels of oats that could be harvested as grain. Oat silage is higher in percent crude protein than corn silage but lower in percent total digestible nutrients (TDN), so its feeding value is approximately 85 percent that of corn silage.

Hay and Haylage

Selling hay or haylage as a standing crop is essentially the same as renting established hay land. Cash rent for land with an established grass/legume hay crop varies widely depending on yield, hay quality and local demand. See *AgDM File C2-10, Cash Rental Rates for Iowa Survey*, www.extension.iastate.edu/agdm/wholefarm/pdf/c2-10.pdf, for updated hay rental rates. For the first cutting of hay or haylage a charge equal to 40-50 percent of the yearly rent is appropriate. Later cuttings are usually worth only 25-35 percent of the yearly rent.

The value of standing hay also can be estimated by subtracting harvesting costs from the market value of the same hay. Custom rates can be used to estimate harvesting costs.

Example 3 (Small square bales)

Price of alfalfa hay	\$5.00 per bale
Harvesting costs	\$1.00 per bale
Hay value in the field	\$5.00 - \$1.00 = \$4.00 per bale

For haylage, the feed value of a ton of 40-50 percent moisture unharvested haylage can be estimated as equal to roughly half that of a ton of dry hay, minus the costs for windrowing, harvesting, and hauling.

Example 4

Price of hay	\$90.00 per ton
Harvesting costs	\$18.00 per ton
Standing haylage value	$(\$90.00 \times 0.5) - \$18.00 = \$27.00$ per ton

Some owners prefer to keep part of the hay crop instead of charging cash rent. For an established crop for which the owner pays all the fertility costs, the owner is probably entitled to about 60 percent. If the person who harvests the crop pays part of the establishment and fertility costs, the owner's share should probably be only 40-50 percent.

Cornstalks

Cornstalks can be used as a partial replacement for late fall pasture or winter hay. For beef cows, a ton of harvested cornstalks is worth about 50 percent of the value of grass hay per ton. If the buyer harvests the stalks, then a value of 25 percent of the price of grass hay is appropriate. See AgDM File A1-70, **Estimating a Value For Corn Stover**, www.extension.iastate.edu/agdm/crops/pdf/a1-70.pdf, for more information.

Cornstalks also can be rented for grazing. See AgDM File C2-10, **Cash Rental Rates for Iowa Survey**, www.extension.iastate.edu/agdm/wholefarm/pdf/c2-10.pdf for updated grazing rental rates.

When hay or cornstalks are harvested as large round bales, weighing them may not be convenient. The weight of a large round hay bale can be estimated by multiplying the length of the bale (in inches) by the diameter squared (in inches) and dividing by 200. For cornstalk bales, divide by 300.

Example 5

Length of hay bale	60 inches
Diameter of hay bale	65 inches
Weight of hay bale	$60 \times 65 \times 65 / 200 = 1,267$ pounds

In years of low production, prices for standing forages may be considerably above those discussed. On the other hand, when feed is in good supply the landowner may have to accept a lower price. If there is no ready alternative use for the feed, then both buyer and seller will still benefit from the sale.



Photo courtesy of USDA.

Iowa State University Extension and Outreach does not discriminate on the basis of age, disability, ethnicity, gender identity, genetic information, marital status, national origin, pregnancy, race, religion, sex, sexual orientation, socioeconomic status, or status as a U.S. veteran. (Not all prohibited bases apply to all programs.) Inquiries regarding non-discrimination policies may be directed to the Diversity Officer, 2150 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, 515-294-1482, extdiversity@iastate.edu. All other inquiries may be directed to 1-800-262-3804.

By William Edwards,
retired extension economist
Chad Hart, extension economist and
associate professor
Department of Economics,
Iowa State University
www.extension.iastate.edu/agdm
store.extension.iastate.edu