

CONTRACTING CORN SILAGE FOR YOUR DAIRY

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The dairy industry continues to change as herd size relative to crop acres increases. This creates a need for more off-farm corn silage to be purchased and more manure to be exported off farm.

A corn silage contract can be mutually beneficial. **The buyer can benefit** with the purchase of a high volume, energy-rich feed that can be harvested and stored in a timely fashion. This feed has a value per ton of dry matter that is of more cost effective than other grain or forage alternatives. It may also provide an opportunity to dispose of excess manure for dairies needing additional land for manure disposal. **The seller can benefit** by increasing net returns.

There are many ways to value corn silage¹. One option is to price the corn silage per ton standing in the field at 7-8 times the price of corn per bushel. Another option, and the one being explained here, is to sell the corn based on its grain value and exchange the non-grain bio-mass for the buyer's dairy manure.

In this option, the corn silage seller benefits by attaining a local market price with less labor and without harvest, drying, transportation or storage costs. And, the buyer re-applies manure at least to the value of the most limiting nutrient, usually Phosphorus (P).

Table 1 shows the seller can improve profits by selling the corn as corn silage versus grain. Either way, the crop producer receives the value for the grain produced.

Table 1. Comparison of Returns: Grain versus Silage (per acre)²

	Corn for Grain³ for Cash Sale	Corn Silage⁴ for Dairy Sale
Gross Income		
Crop Sales (175 bu x \$4.50)	\$788	\$788
Farm Program Payments	\$ 22	\$ 22
Total Gross Income	\$810	\$810
Cash and Machinery Costs		
Seed	\$127	\$127
Fertilizer	\$178	\$178
Stover Nutrient Loss (above manure application)		\$ 80
Chemicals	\$ 44	\$ 44
Machinery Costs	\$110	\$ 45
Drying Costs	\$ 45	none
Other (Insur., Int., Misc.)	\$ 52	\$ 52
Total	\$556	\$526
Returns after Cash & Machinery Costs	\$254	\$284
Returns after Land Charge (\$290/acre)		- \$36 - \$6

Note: labor costs not included but would be lower for the corn silage for Dairy Sale.

Thus, in the above example, returns can be improved by \$30/acre by selling the crop as corn silage versus grain since machinery, labor and other costs are saved by not needing to harvest, transport, store and/or dry the corn. An issue needing attention is the lessened amount of residue left in the field from both a nutrient and environmental perspective. However, the use of cover crops and/or timely application of dairy manure bartered in the transaction could and should reduce this issue to a more negligible level.

The trading of the corn stalk bio-mass for dairy manure can be a win-win situation. Based on ISU estimated 2013 prices, the value of the nutrients removed in the corn silage, excluding grain, is estimated at \$6 per ton. A thousand gallons of liquid dairy manure has 25 pounds of nitrogen, 12 pounds of P₂O₅ and 11 pounds of K₂O (every ton of solid dairy manure contains approximately 12 lbs Nitrogen, 6 lbs P₂O₅ and 12 lbs of K₂O)⁵. Twenty four tons of corn silage per acre (stover and grain) removes an estimated 193 pounds of N, 84 pounds of P₂O₅ and 216 pounds K₂O. Application of 7,000 gallons of liquid manure per acre (14 Tons of solid manure) will meet P removal rate from the corn silage. In order to replace all nutrients, additional commercial fertilizer at the rates of 18 pounds of N and 139 pounds K₂O (25 pounds of N and 48 pounds of P with solid manure application) needs to be applied to meet nutrient removal. This cost of this fertilizer amount⁶ is equivalent to the cost of Stover Nutrient Loss in Table 1.

¹ Consult ISU Extension and Outreach publications A1-65 Pricing Forage in the Field; A1-70 Estimating a Value for Corn Stover; and worksheet Pricing Corn Silage at: www.extension.iastate.edu/agdm

² Values based on the ISUEO Estimated Costs of Crop Production in Iowa - 2013

³ 185 bushel yields (corn following corn)

⁴ 24 tons per acre actual corn silage yield (corn silage following corn)

⁵ Values provided by Dan Huyser, ISU Engineer Field Specialist, NE Iowa

⁶ Note that additional nutrients may be needed in subsequent years due to nutrient availability following corn stover breakdown or manure application.

Corn silage contracts must be equitable for both parties

The minimum price the seller would sell for is the value of the corn grain if brought to market. The maximum price the buyer would buy for is the value of competitive forage and grain feedstuffs. The buyer and seller should both determine a value per ton or per acre of corn silage and come to an agreement between both values.

Example

Value to the seller is based on per bushel of grain and then valued on per acre or ton of silage harvested.

If the selling price for corn is \$4.50 per bushel, for example, and it takes \$0.58 per bushel in harvesting, drying, handling, and storage cost, the value to the seller is \$3.92 per bushel. At an average of 175 bushel corn per acre, the crop is worth \$686 per acre to the seller. If re-applying manure was not part of the contract, an additional \$144 per acre will be added for the value of nitrogen, phosphorus, and potassium removed with the stover⁷.

Table 2. Bushels of Grain and Related Tons of Corn Silage

Corn Grain Yield, bushels/acre	Silage Yield at 35% DM, Tons/acre
100	14.2
125	17.0
150	20.2
175	24.1
200	29.3

Source: Lauer & Undersander, Univ. Wisconsin, 2004

As shown in Table 2, the equivalent of 175 bushels is 24 expected tons of corn silage. Table 3 outlines the value of corn silage to the seller and buyer; an equitable or fair price can be determined by evaluating net values for both parties. For the seller, the value per ton is \$35 per ton in the field without manure application. The value to the buyer will also include the costs for chopping, hauling, filling, and packing/bagging the corn silage. For

⁷ Nutrient removal values were taken from 'Nutrient Removal When Harvesting Corn Stover' and 'Update to Iowa Phosphorus, Potassium and Lime Recommendations', John Sawyer and Antonio Mallarino, ISU Agronomists

the same field, the buyer estimates on a per ton basis the value of 35% dry matter silage based on nutrient value (i.e. value of starch, NDF, ect.). This value equals \$41 per ton or \$0.059 per pound of dry matter.⁸

The buyers cost of chopping, hauling and ensiling the corn silage is estimated at \$8 per wet ton (\$7-\$8.50 range), based on custom rate estimates. Another \$3 to \$4 per ton is typical for storage costs. Therefore, the total 35% dry matter corn silage value to the cow would be \$52 (\$41 + \$11). This does not include the shrinkage due to fermentation and feeding losses. The buyer and seller can then negotiate the value per ton based on the difference of each determined price.

The % dry matter is important to determine. Priced at the field, silage at 40% dry matter is valued at \$47 (800 lbs. dry matter x \$.059) and silage at 30% dry matter is valued at \$35 (600 lbs. dry matter x \$.059). This assures that the grower will receive the same gross payment regardless if harvested at varying moisture levels. The value to the buyer will also include the cost to chop, haul, fill, or pack the silage.

The per bushel of corn harvested would require a pre-harvest yield check. If the payment is based per ton harvested, it is critical to have accurate dry matter tests and yield estimates. This will require moisture testing representative samples daily or by field. In addition, weighing all representative loads of silage across a scale is needed or knowing the capacity of the bunker, silos, or bags used. Price adjustments will be needed for corn silage at varying moisture levels.

Grain price can be taken as the local price at harvest, an average across the harvest month, or average of harvest month price across contract months. Price should be agreed up on by both parties and put in writing to prevent misunderstandings. Consult UW-Extension publication "Contract Feed Production Arrangements" for more information on drawing up contracts.⁹

Table 3. Example Calculating Net Values per bushel, ton, and acre

Value based on Corn Yield

Selling Price for shelled corn (@ 85% dry matter)	= \$4.50/bushel
Minus harvesting cost (\$52.50/acre / 175 bushel)	= - \$.30/bushel
Drying, handling, storage (\$50/acre / 175 bushel)	= - \$.28/bushel
Net Value to Seller	= \$3.92/bushel

175 bushels corn @ \$3.92 bushel

Net Value to Seller (with manure)	= \$686.00/acre
Or	= \$ 28.58/ton

*Plus nutrients removed

*only if manure is not to be returned to the land.

Net Value to Seller (without manure)	= \$830.00/acre
Or	= \$ 34.58/ton

Value based on Corn Silage Value

Number of tons of corn silage harvested at 35% dry matter

Net Value to Buyer (with manure)	= \$41.40/ton
Cost for harvesting, transporting and bagging	= +\$11.00/ton
Net Value to Buyer (with manure)	= \$52.40/ton

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⁸ Value derived from FeedVal, <http://www.uwex.edu/ces/dairynutrition/>

⁹ Contract Feed Production Arrangements, Joe Stellato, UW-Extension, Shawano County. <http://www.uwex.edu/ces/crops/uwforage/contracts.pdf>.