

# GUIDELINES FOR PRICING SILAGE, EARLAGE, OR SNAPLAGE FROM IMMATURE CORN



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Delayed planting, lack of growing degree-days, drought, hail or insect damage, or early frost can all result in immature corn at harvest. Depending upon the degree of immaturity, harvesting corn as silage, earlage, or snaplage may result in greater crop revenue than harvesting as high-moisture or dry-shelled corn. This fact sheet summarizes typical corn nutrient values with varying harvest, storage, or processing methods. Pricing methods and considerations are also described that may serve corn crop owners and livestock producers as a basis to enter value negotiations.

## CORN HARVEST METHODS

Immature corn can be harvested for livestock feed in a variety of methods. These include green chop, corn silage, high-moisture corn, corn and cob meal (little contamination from husks, leaves and tassel), earlage, (ear and husks with small amounts of leaf and tassel), and snapped corn (ear, husks and a significant amount of leaves and tassel). As more stalk, tassel, leaf and husk are included, feed energy density decreases. This fact sheet focuses on corn silage, earlage, and snaplage as they are popular methods of harvest.

Corn nutrient content for different harvest, storage, and processing methods for beef cattle are presented in Table 1. Corn harvested before kernel black-layer formation (sign of physiological maturity) is considered immature. Silage made from immature corn may yield less tonnage, but may have up to 80% of the net energy for gain (0.36 Mcal NE<sub>g</sub> /0.44 Mcal NE<sub>g</sub> = 0.82) for growing and finishing cattle compared to normal, well-eared corn silage. Immature corn plants will have less starch from a lower percentage of filled

kernels, but this is partially offset by a greater amount of digestible sugars and fiber than mature corn.

Table 1. Average corn nutrient content with different harvest, storage, and processing methods

Corn product	Dry matter, %	TDN, %	NE <sub>m</sub> , Mcal/lb	NE <sub>g</sub> , Mcal/lb	Crude protein, %
Dry rolled	87	88	0.99	0.68	8.8
Silage, well-eared	33	68	0.71	0.44	8.2
Silage, few ears	29	62	0.63	0.36	8.4
Earlage	63	84	0.94	0.64	8.1
Snaplage	59	82	0.91	0.61	8.1
High-moisture	71	90	1.02	0.71	8.8
Steam flaked	81	95	1.08	0.76	8.5
Dry ear	83	85	0.94	0.64	8.3
Stalklage	41	54	0.50	0.25	6.8

Source: Nutrient Requirements of Beef Cattle, 2016<sup>1</sup>

## IMMATURE CORN HARVEST CONSIDERATIONS

Immature corn made into silage may have a higher moisture content compared to that made with mature corn. Corn silage above 60 to 65% moisture content will store better in horizontal or bag silos compared to a uprights. Corn silage with more than 70% moisture risks clostridial fermentation, excess leachate, reduced nutrient content and lowered feed dry matter intake. To ensure proper moisture content, corn can field dry to the proper moisture, even after frost. Other ways to compensate for high moisture include raising the stalk cutting height, or mixing in dry feeds before ensiling. Drought-stressed or frosted corn may accumulate nitrate. Cutting height can be raised to reduce nitrate that accumulates in the lower stalk, but when high nitrate is suspected, testing a representative sample is the best management practice. For more information on nitrate toxicity, see [“Make a plan for drought-stressed corn silage in 2018<sup>2</sup>.”](#) Environmental conditions leading to an immature

corn crop may also create conditions conducive to mold growth. Though many different molds may occur, those of greatest concern in Michigan are typically *Gibberella* and *Fusarium* ear rot. These molds produce mycotoxins, which may result in unpalatable or even toxic feedstuffs. For information regarding mycotoxins, see "[Corn ear rots and mycotoxins](#)<sup>3</sup>."

### PRICING OF IMMATURE CORN FOR SILAGE

Agreements to price corn for silage often rely upon discovering a price for corn standing in the field. Corn silage at the feed bunk is often valued near 10 times the price of #2 corn, but in the field it is valued near 7 times the price of #2 corn. Although these two factors are used as thumb-rules, it is more equitable to consider factors that vary among situations in deriving a fair price.

Worksheet 1 (see also accompanying spreadsheet) provides a stepwise calculation of maximum bid price of corn standing in the field. If well-eared corn silage is 65% moisture (as-is), 1 ton (**T**) contains 700 lb of dry matter (**DM**), 350 lb of which would be corn grain, or about 50% of the DM. With standard #2 corn that is 15.5% moisture (as-is), 1 bushel (**bu**) contains 47.32 lb of DM (56 lb as-is  $\times$  0.845 DM). Therefore, 1 ton of as-is, well-eared, corn silage would be expected to contain 7.4 bu of corn grain (350 lb DM/47.32 lb DM). If #2 corn price is \$3.80/bu, silage value is estimated as 7.4 bu  $\times$  \$3.80/bu  $\times$  0.845 DM = \$33.26/T. Immature corn silage may have less than 50% grain in the dry matter. Therefore, an estimate of grain percentage may be used to adjust the price appropriately. The remaining stover portion of the silage can be valued at a price equivalent to grass hay (*i.e.* 60% TDN, 8% crude protein). A good source for hay values is the [Michigan Hay Listing Network](#)<sup>4</sup>. In this example, 50% of the DM comes from the stover, so 350 lb stover  $\times$  \$0.047/lb (\$100/T hay / 85% DM) = \$20.59/T in stover value. Total value of corn silage at the feed bunk is \$33.26/T (grain portion) + \$20.59/T (stover portion) = \$53.85/T.

More often than not, the crop owner and livestock producer are trying to arrive at a price for the crop standing in the field. Therefore, costs between the field and feed bunk must be accounted, including harvesting, hauling, packing, storing, and storage and harvest shrink. These costs can be estimated by using Michigan custom rates as a starting point (see [Custom](#)

[Machine and Work Rate Estimates](#)<sup>5</sup>). That report contains estimates for harvesting, as well as silo and bunker filling tasks. Hauling charges in the report are based on average distances traveled, so an adjustment may be made for unusually long haul distances. These costs are subtracted from value in the feed bunk to arrive at a maximum bid value for corn standing in the field.

### PRICING OF IMMATURE CORN FOR EARLAGE OR SNAPLAGE

Worksheet 2 provides a method to price standing corn intended for earlage or snaplage. Earlage and snaplage have varying amounts of grain, husk, and other material<sup>6</sup>. Earlage or snaplage made from immature corn may have highly variable grain content because of failure to reach physiological maturity. Pricing of these feeds can be accomplished by pricing according to relative energy content of corn grain. Using this method requires analysis of a feed sample. See recommendations for [sampling feeds](#)<sup>7</sup> before sending to a [commercial laboratory](#)<sup>8</sup> for analysis. The feed analysis should minimally include dry matter and net energy for gain ( $NE_g$ ) determinations.

In the Worksheet 2 example, 0.64  $NE_g$  Mcal/lb in average earlage divided by 0.68  $NE_g$  Mcal/lb in average corn grain equates to earlage having 94% of corn grain's energy value. Corn grain priced at \$3.80/bu has a value of \$0.0803/lb DM (\$3.80 / 56 lb/bu / 84.5% DM). There are 1,260 lb DM in one ton of 37% moisture (as-is) earlage (2000 lb/T  $\times$  63% DM). Earlage delivered to the feed bunk would be worth 94% energy  $\times$  \$0.0803/lb DM  $\times$  1,260 lb DM = \$95.11/T. When pricing in the field, subtraction of expenses related to harvesting, hauling, packing, storing, and storage and harvest shrink are done exactly as for the earlier corn silage example. If snaplage has a significant amount of leaves and tassels, forage value could also be considered as in the corn silage example.

**An accompanying Excel tool automates calculations of Worksheets 1 and 2.** <https://www.canr.msu.edu/resources/tool-for-pricing-silage-earlage-or-snaplage-from-immature-corn>

### AGREEMENT CONSIDERATIONS

An mutually agreed upon, written and signed contract should be developed between buyer and seller. The

contract should include:

- how yield will be determined. Details, such as how frequently loads will be weighed and tested for moisture, should be described. Although it is possible to estimate tonnage from silo or pile dimensions, this type of estimate lacks precision necessary for fair pricing.
- how moisture will be determined. Details on the method (see [Methods for Determining Dry Matter](#)<sup>9)</sup> or referencing the method to be used, along with the frequency of determination are important.
- origin and date of obtaining a corn price for future pricing (*i.e.* opening bid price on the second Tuesday of November at the local grain elevator).
- whether or not there is a lien on the crop. If there is a lien, the payment procedure should be noted.
- the payment terms. Will payment be expected upon harvest completion, or will some form of installment payments be preferred? A 10 to 25% down-payment with several monthly installments of the balance is somewhat common. Some farms have elected to use a 12-month payment plan that accounts for monthly changes in commodity prices and adjusts monthly payments accordingly. Delayed payment options may provide income tax management benefits for the seller by dividing income between tax years.
- how the buyer will guarantee payment. Sellers may get nervous when they deliver \$50,000 worth of corn silage to a farm that will soon feed up the inventory. This may be especially true for parties that have not had past business dealings. Solutions may include a guaranteed lender note, up to a set dollar amount, or establishment of a third-party escrow account that the seller can draw upon as the corn product is delivered.

### **CROP INSURANCE AND USDA PROGRAMS**

If producers decide to harvest a crop for a feedstuff other than grain, crop insurance and USDA programs should be considered.

- If the corn is insured under a USDA Risk Management Agency (RMA) insurance plan (*i.e.* yield protection, revenue protection, or revenue protection with harvest price exclusion), the crop insurance provider should be contacted to discuss potential yield appraisal requirements prior to any forage related harvest activities. To qualify for grain-based indemnity payments, a field yield determination will be required. If this is not done,

the insurance provider can determine the acreage was “destroyed without consent” leaving the producer ineligible to receive a claim.

- Crop owners should verify that their corn acres, planted as grain, are certified as grain acres with the USDA Farm Service Agency (FSA). This will ensure producers are eligible for programs, such as the Market Facilitation Program (MFP), which currently does not list corn silage as an eligible crop for payment. This same certification is also used in eligibility determinations for indemnity payments with RMA crop insurance programs.

### **REFERENCES**

1. National Academies of Sciences, Engineering, and Medicine. 2016. Nutrient Requirements of Beef Cattle, 8<sup>th</sup> Revised Ed. Washington DC: The National Academies Press <https://doi.org/10.17226/19014>.
2. Kaatz, P. 2018. Make a plan for drought-stressed corn silage in 2018. Michigan State Univ. Ext., E. Lansing. Available: <https://www.canr.msu.edu/news/make-a-plan-for-drought-stressed-corn-silage-in-2018>.
3. Chilvers, M. 2016. Corn ear rots and mycotoxins. Michigan State Univ. Ext., E. Lansing. Available: [https://www.canr.msu.edu/news/corn\\_ear\\_rot\\_and\\_mycotoxins](https://www.canr.msu.edu/news/corn_ear_rot_and_mycotoxins).
4. Michigan Hay Listing Network. Accessed September 20, 2019. <http://web2.canr.msu.edu/hay/haylist.cfm>.
5. Battle, B. 2019. 2019 Custom machine and work rate estimates. Michigan State Univ. Ext., E. Lansing. Available: [https://www.canr.msu.edu/field\\_crops/uploads/files/MSUCustomWorkRatesJune2019.pdf](https://www.canr.msu.edu/field_crops/uploads/files/MSUCustomWorkRatesJune2019.pdf).
6. Lardy, G. and V. Anderson. 2016. Harvesting, storing and feeding corn as earlage AS-1490 N. Dakota State Univ., Fargo. Available: <https://www.ag.ndsu.edu/publications/livestock/harvesting-storing-and-feeding-corn-as-earlage>.
7. Anderson, B. T. Mader, and P. Kononoff. 2007. Sampling feeds for analysis. Univ. Nebraska-Lincoln Ext. Pub. G331. Available: <http://extensionpublications.unl.edu/assets/html/g331/build/g331.htm>.
8. Michigan Dept. of Ag. and Rural Dev. 2018. Michigan commercial feed testing laboratories list. Available: [https://www.michigan.gov/documents/mdard/MI\\_COMMERCIAL\\_FEED\\_TESTING\\_LABORATORIES\\_12-4-14\\_475719\\_7.pdf](https://www.michigan.gov/documents/mdard/MI_COMMERCIAL_FEED_TESTING_LABORATORIES_12-4-14_475719_7.pdf).
9. Bucholtz, H. 2007. Methods for determining dry matter of forages and grains. Dept. Anim. Sci., Michigan State Univ., E. Lansing. Available: [https://www.canr.msu.edu/uploads/236/58572/Methods\\_for\\_Determining\\_Dry\\_Matter.pdf](https://www.canr.msu.edu/uploads/236/58572/Methods_for_Determining_Dry_Matter.pdf)

## Worksheet 1. Maximum Bid Price for Corn Standing in the Field for Use as Corn Silage

Maximum Bid Price for Corn Standing in the Field for Use as Corn Silage			
<i>bu = bushel, T=ton, DM = dry matter</i>		\$/T as-is	
Silage value in feed bunk	Example \$/T as-is	Inputs	Your Farm
<b>1. Silage moisture</b>		Moisture, %	
<b>2. Silage value in feed bunk (grain portion), \$/T as-fed</b> <i>2,000 lb/T x (1 - 65% moisture) = 700 lb DM/T silage</i> <i>700 lb DM x 50% corn grain = 350 lb corn grain DM/T silage</i> <i>350 lb corn grain DM/47.32 lb [DM in 1 bu of corn] = 7.4 bu corn grain/T silage</i> <i>\$3.80/bu corn grain/(84.5% DM) x 7.4 bu corn = \$33.26/T silage (grain portion)</i>	<b>\$33.26</b>	Corn grain in silage DM, %	
		Corn price at feed bunk, \$/bu	
<b>3. Silage value in feed bunk (forage portion), \$/T as-fed</b> <i>2,000 lb x (1 - 65% moisture) = 700 lb DM</i> <i>700 lb x 50% forage = 350 lb forage DM/T silage</i> <i>350 lb forage DM / 2,000 lb/T = 0.175 T forage DM</i> <i>\$100/T hay/85% DM [in hay] = \$117.65/T DM</i> <i>0.175 T forage DM x \$117.65/T DM = \$20.59/T silage (forage portion)</i>	<b>\$20.59</b>	Forage in silage DM, %	<b>100%-Grain%</b>
		Grass hay, \$/T	
<b>Silage value in feed bunk, \$/T as-fed (Line 2 and 3)</b>	<b>\$53.85</b>		
<b>Expenses to harvest, transport, and store silage</b>			
<b>4. Shrink loss, \$/T as-is</b> <i>(typically 10-18% depending on degree of packing, covering, and feed face mgmt)</i>	<b>\$8.08</b>	Shrink loss, %	
<b>5. Storage cost, \$/T as-is</b> <i>(amortized cost of silo or bunker, or full cost of bag and bagging)</i>	<b>\$4.25</b>		
<b>6. Harvesting, \$/T as-is (chopping)</b>	<b>\$6.75</b>		
<b>7. Hauling and packing, \$/T as-is (depends upon distance)</b>	<b>\$7.25</b>		
<b>8. Total Expenses, \$/T as-is (Line 4, 5, 6 and 7)</b>	<b>\$26.33</b>		
<b>Maximum bid price for corn standing in the field, \$/T as-is</b> <i>(Silage value in feed bunk - total expenses)</i>	<b>\$27.52</b>		

## Worksheet 2. Maximum Bid Price for Corn Standing in the Field for Use as Earlage or Snaplage

Maximum Bid Price for Corn Standing in the Field for Use as Corn Earlage/Snaplage			
<i>bu = bushel, T=ton, DM = dry matter</i>			
<i>Earlage/Snaplage value in feed bunk</i>	<i>Example \$/T as-is</i>		<i>\$/T as-is</i>
			<b>Inputs</b>
			<b>Your Farm</b>
<b>1. Earlage/Snaplage moisture</b>		Earlage/snaplage moisture, %	
<b>2. Corn Earlage @ feedbunk, \$/T as-fed</b>	<b>\$95.11</b>	Net Energy as % of corn grain	
<i>0.64 NEg Mcal/lb earlage / 0.68 NEg Mcal/lb corn grain = 94%</i>		Corn price at feed bunk, \$/bu	
<i>corn grain = \$3.80 / 56 lb/bu / 84.5% DM = \$0.0803/lb DM</i>			
<i>earlage = 2000 lb/T x 63% DM = 1260 lb DM/T</i>			
<i>94% energy x \$0.0803/lb DM x 1,260 lb DM = \$95.11</i>			
<b>Expenses to harvest, transport, and store silage</b>			
<b>3. Shrink loss, \$/T as-is</b>	<b>\$11.41</b>	Shrink, %	
<i>(typically 10-18% depending on degree of packing, covering, and feed face mgmt)</i>			
<b>4. Storage cost, \$/T as-is</b>	<b>\$4.25</b>		
<i>(amortized cost of silo or bunker, or full cost of bag and bagging)</i>			
<b>5. Harvesting, \$/T as-is (chopping)</b>	<b>\$6.75</b>		
<b>6. Hauling and packing, \$/T as-is (depends upon distance)</b>	<b>\$7.25</b>		
<b>7. Total expenses, \$/T as-is (Line 3, 4, 5, and 6)</b>	<b>\$29.66</b>		
<b>Maximum bid price for earlage or snaplage in the field, \$/T as-is</b>	<b>\$65.45</b>		
<i>(Earlage value in feed bunk - total expenses)</i>			

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