Thinking through Corn Silage Economics
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Kenny Burdine and Greg Halich

We have been getting many questions about corn silage over the last few days. Silage was an attractive alternative feed last year for livestock producers with corn prices fairly low at harvest time and hay prices high. This year, with higher grain prices and cheaper hay, corn silage looks less attractive as a feed substitute. However, it is still an option worth evaluating. We thought it would be useful to review some simple corn silage economics as you work with clientele over the coming weeks.

The first thing to ask when determining the value of corn silage is whose point of view are we looking from? To a corn producer, silage is worth its grain value + / - any costs incurred or saved when harvesting for silage rather than grain. The value per ton after these adjustments are made is the minimum that the grain producer should accept for silage.

Whenever possible, producers should use their own costs for calculations. However, the custom machinery rate survey can serve as a useful guide for estimating the cost of operations such as grain harvesting, silage chopping, etc. Here are some examples to consider.

Valuing Silage (Grain Growers Perspective)

1. Grain value per bushel: yield x price.
2. Subtract grain harvesting, drying, and trucking costs per acre.
3. Add chopping, hauling, and filling costs per acre (when applicable).
4. Add net nutrient value removal (nutrient value of silage less nutrient value grain) per acre.
5. Divide by silage yield (tons per acre).

Example – Grain Growers Perspective:
Assumptions: 150 bushel corn at 21.0 ton corn silage.

150 bu @ $5 per bu	$750
- Harvesting, drying, and trucking costs	($85)
+ Chop, haul, and fill costs (21.0 tons @ $8)	$168
+ Net nutrient value (19#P_2O_4, 128#K_2O)	$114
"Breakeven" value compared to grain	$947

Divide $947 by 21.0 tons = ***$45.10 per ton***.
Based on the assumptions made above, $45.11 per ton represents the minimum price that a grain farmer should be willing to sell silage for given that the grain farmer was responsible for chopping, hauling, and filling the silage. Subtract approximately $8 per ton, for a minimum price of $37.10, if the grain farmer was not responsible for chopping, hauling, and filling.

Valuing Corn Silage (Livestock Feeding Perspective)

From the livestock feeder's perspective, the cost to produce the silage is not relevant. To a livestock producer, the value of any feed is determined by the next cheapest substitute. The following equation can be used to estimate the feed value of the silage:
Feed Value =

$$\frac{\text{(Price of Substitute, per ton) x (TDN Silage) x (Dry Matter Silage) x (1 – Waste Rate Silage)}}{\text{(TDN Substitute) x (Dry Matter Substitute) x (1 – Waste Rate Substitute)}}$$

This equation seeks to apply to an appropriate price adjustment factor to corn silage based on the price of a given feed substitute such as grass hay. This is done by considering the relative differences in dry matter, energy, and waste rates between the two alternatives. This feed value equation needs to be adjusted if the livestock producer will chop, haul, or fill the silage and/or if labor and machinery costs are significantly different in feeding silage vs. feeding the alternative (e.g. feeding silage using wagons vs. feeding round bales). A reasonable estimate for the additional labor and machinery costs of feeding silage versus hay is around $3 per ton of silage fed.

If we assume hay is the feeding alternative at 55% TDN, 85% dry matter, 25% waste rate, and silage at 65% TDN, 35% dry matter, 10% waste rate then the equation able simplifies to (Hay Price per ton) x (.584). Then we can subtract relevant processing costs such as chopping, hauling, and filling that might be incurred by the livestock producer as well as the additional or net feeding costs per ton:

Feed Value = (.584) x (Hay Price per ton) – processing costs – net labor/mach costs.

If the grain farmer is chopping, hauling, and filling and assuming a reasonable net labor and machinery cost of $3 per ton the equation can be further simplified to:

Feed Value = (.584) x (Hay Price per ton) – $3

If hay is worth $80/ton:

Feed Value = (.584) x ($80) – $3 = $43.72

The $43.72 represents the maximum price a livestock farmer would be willing to pay for silage given the above assumptions with hay priced at $80 per ton. The following table gives this maximum price at different hay prices and different waste rates for silage. Results are rounded to the nearest $0.50 increment.

Table 1: Maximum Feed Value of Corn Silage Per Ton Basis

	Hay Price per Ton				
Waste Rate Silage	**$60**	**$70**	**$80**	**$90**	**$100**
5%	$34.00	$40.00	$46.50	$52.50	$58.50
10%	$32.00	$38.00	$43.50	$49.50	$55.50
15%	$30.00	$35.50	$41.00	$46.50	$52.00

Assumptions: Waste rate of hay 25%; TDN hay 55%; Dry matter silage 35%; TDN silage 65%. Processing costs are not paid by livestock producer. If livestock producer does pay some processing costs, they should be deducted from these values on a per ton basis.

Summary: Based on the above analysis, there doesn't appear to be much opportunity for both the grain and livestock producer to benefit from the sale of corn silage at current prices. In other words, the grain producer would have to accept less than what the silage is worth to him, or the livestock producer would have to buy the silage at more than the equivalent feed value with corn selling at $5.00 and hay selling for $80 per ton. Average to good quality grass hay (55% TDN) would have to be priced at $90 and above before there would be appreciable benefits to both parties. This discussion also focused mostly on the energy value of silage versus hay and assumed that the protein levels were roughly the same. If significant protein supplementation were needed with wither corn silage or the alternative feed, then additional adjustments would need to be made. However, these adjustments would be minor in most situations involving beef cattle.