Assigning Value to a Standing Forage Crop

This informational sheet was originally created in 2019 to aid Ohio farmers in pricing standing forage for sale or insurance claims related to adverse weather conditions; the principles & guidelines continue to apply.

Question: How do I set a price to buy a standing hay crop still growing in the field?

Answer: How to value a standing hay crop is challenging. Assigning an appropriate value includes the buyer and seller agreeing on the market value for the hay and then adjusting for harvest costs and other factors that contribute to the price of hay sold in the open market, some of which are challenging to quantify.

In this discussion we are considering just the single crop of hay that is ready to harvest. The grower's base price equals the price they could receive for the crop from the hay market less harvesting/storage/marketing costs. Hopefully,this covers production costs and generates a profit. During price negotiations, it must be recognized that harvest risk is being shifted from the grower to the buyer, which should be applied as a further discount against the price paid by the buyer.

Valuing the standing crop – discovering market price

Market reports are available but vary in their ability to identify quality or type of hay crop. Some report values per ton, others per bale which has little value if weight is unknown. Until a crop is harvested, the final quality is uncertain.

Sources include:

Auction reports

https://www.farmanddairy.com/markets/ohio
Ohio livestock and hay auctions are reported weekly. Scroll to end of each auction's report to find data for any hay and straw sales.

https://fyi.extension.wisc.edu/forage/h-m-r/
Hay market report from quality tested hay auctions in the Midwest U.S.

National & state surveys

https://hayandforage.com/articles.sec-7-1-Markets.html
USDA hay markets are reported weekly here. Prices are per ton and categorized by quality. Pennsylvania is the closest state to Ohio included in the survey. Could use data from states further away adjusted for transportation costs.

https://www.nass.usda.gov/Statistics_by_State/Ohio/Publications/Ag_Across_Ohio/index.php USDA Ohio monthly reports usually include hay prices

These reports provide data for dry hay, typically about 85% dry matter (DM). If the hay crop will be harvested as haylage, final price should be adjusted for DM.

Adjusting price for dry matter

We assume a hay DM of 85% if actual DM is not known. If actual DM is assayed (after it is baled), that value should be used to adjust the price.

Formula:

DM adjustment = [(actual %DM ÷ 85) x Market price] – Market price

Example:

Hay market price is $200/ton
Hay you purchased from the field has a baled DM of 82%

DM Adjustment = [(82 ÷ 85) x 200] - 200 = –$7.06/ton, so adjusted price for DM is $193.

Hay baled too wet will mold (large squares bales with less than about 80 to 82% DM are at high risk for mold). Molding is a risk assumed by the buyers which reduces the value of hay (discussed below). Haylage put up too wet or too dry will not ferment as well and is also a risk assumed by the buyer.

Adjusting for feed value

Feeds have value because they provide needed nutrients to animals. Forages contain varying concentrations of energy, protein, ‘chewable’ or ‘effective’ fiber, and minerals. Increasing the concentrations of the nutrients generally increases the value of the feed. However, with forages the value of increasing concentrations of nutrients depends on the nutrient requirements of the animal. For example, if hay with a crude protein (CP) concentration of 13% meets the protein requirement of a beef cow, hay with 15% CP is not worth any more to a beef producer than hay with 13% CP. Furthermore, cows require effective fiber but hay with too much fiber depresses intake and milk production, especially in high producing dairy cows which reduces the value of the hay.

Adjusting the price of hay or standing forage based on nutrients requires that it be sampled and tested. Because of time, analyzing nutrient composition is not possible with standing crops so any adjustments (up or down) would need to be made after the hay is in the barn. Many market prices are often for ‘hay’ without any indication of quality. Even with these limitations, adjusting price for nutritional value reduces risk for the buyer (he knows what he is getting) and it rewards the grower for producing better quality forage (usually at the expense of lower yields). Because of all the uncertainties and assumptions involved, we are

recommending using averages and adjusting quality based on relative feed value (RFV) and CP. All commercial labs can analyze or calculate those two numbers.

Table 1. Assumed base composition of market hay (quality unspecified)

Hay Type	Relative Feed Value (RFV)	Crude Protein (CP) % of DM
Predominantly grass	90	13.5
Mixed legume/grass	115	15
Predominantly legume	140	20

Although market or base price varies substantially, based on quality tested hay markets in Wisconsin, the value of 1 unit of RFV has been relatively constant at between 0.8 and 0.9 $/ton. The value of CP varies, largely based on soybean prices, but a value of about $6 per percentage unit per ton is reasonable for forage protein based on current commodity prices.

To adjust for nutritional value, the buyer and seller would agree on an average market price before harvest. After the crop is harvested, it would be sampled, analyzed, and the final price adjusted.

Formula:

Price adjusted for feed value =
Market price + $0.9(Actual RFV – Assumed RFV) + $6(Actual CP – Assumed CP)

Example:

A standing crop is a mix of alfalfa and grass and current average market price for mixed hay is $200/ton. The hay is harvested and sampled and has a dry matter content of 82% (as shown above) and an actual RFV of 125 and 16% CP.

The RFV is 10 units above the assumed base (125 – 115) and CP is 1 unit above the base (16 – 15).

The higher RFV is worth $0.9 x 10 = $9/ton and the higher CP is worth $6 x 1 or an extra $6 per ton. This makes for a total forage quality adjustment of $15.

The dry matter adjusted price calculated above was $193/ton, so to adjust for quality is $193 + $15 = $208/ton. This price still needs to be adjusted for harvest costs and risk assumed by the buyer as discussed below.

The quality adjustment can increase or decrease the value of the hay depending on nutrient composition.

Other price adjustments and considerations

Cost of harvesting

The market value of a harvested crop includes the cost of harvesting. When a crop is sold standing in the field, the cost of harvesting transfers from the seller to the buyer and should be deducted from the market price. If a farmer does not know their costs for harvesting a ton of hay, we have to rely on reasonable estimates. OSU Extension surveys and publishes agriculture custom rates every two years. These provide a reasonable estimate of harvest costs. Use the "Ohio Farm Custom Rates 2020" publication found here: https://farmoffice.osu.edu/farm-mgt-tools/custom-rates-and-machinery-costs

Custom rates for mowing, conditioning, raking, and tedding are reported on a per-acre basis. When setting a price before yield is known, one approach is to calculate the cost of mowing and preparing the hay for harvest per acre times the number of acres and deduct this total cost from the final invoice. Another alternative is to divide the total harvest cost by the final yield in tons once harvest is complete and deduct that cost from the market price per ton before payment is made.

The costs of baling different sizes and types of bales are broken down on a per-bale basis with references to the weight of the bales. With this information, cost of baling can be calculated per ton and deducted from the market price per ton. For instance, the 2020 average reported custom rate for baling 600 to 1,000 pound round bales with net wrap and dropping them in the field is $10.10 per bale. If we assume an 800 pound bale, the per ton cost of baling is (2,000/800) x $10.10 = $25.25 per ton. This is deducted from the market price.

Hauling the hay from the field a reasonable distance to storage is the final cost that is transferred from the seller to the buyer. While Ohio does not have data for this activity in our Custom Rates publication, the University of Iowa reports in their 2022 Iowa Farm Custom Rate Survey an average cost of $3.05 per large round bale (7 farms reporting) or $0.22 /bale/loaded mile by truck or trailer (8 farms reporting). Translating this to a per ton price requires knowing the average weight per bale. Assuming the same 800 pound bales that we baled above, at $3.05 per bale, the cost to haul is (2,000/800) x $3.05 = $7.63 per ton which should also be deducted from the market price.

Discounting for risk

The last factor affecting the value of the standing hay crop is risk. A farmer purchasing the standing hay crop is assuming risk (Will it rain after it is cut and before baling or chopping? If chopped, will it ferment properly? Can it be harvested at exactly the right time? What will the final nutrient content be? etc.) Testing forage and adjusting price accordingly (see above), eliminates nutrient composition risk. If the forage is not tested, variation in nutrient composition is about 10% of the market value. This was calculated based on expected variation

in nutrient composition of alfalfa and grass and the economic value of variation in energy and CP.

Risk associated with rain damage or mold because the hay had to be baled too wet because of rain is hard to quantify. Our recommended estimate is10%. As an example, if the market price of hay is $200/ton, the standing crop would be priced at $200/ton x 0.8 (10% nutrient risk + 10% weather risk) = $160/ton (harvest and storage costs would need to be subtracted from this).

If the forage was priced on measured nutrient composition, then risk would only reduce the value by 10%. Using the price adjusted for dry matter and feed value example above, the $208/ton would be further reduced by 10% ($21) or $208 x 0.9 = $187/ton (that price still needs to be adjusted for harvest costs).

To summarize:

1) Determine market price
2) Calculate and apply deductions:
    a. Cost of harvest including mowing, tedding, raking
    b. Cost of baling
    c. Cost of hauling
    d. Risk – nutrient variation
    e. Risk – weather, etc.
3) Adjustments: These optional adjustments can be made if a forage analysis is done post-harvest:
    a. Dry matter
    b. Feed value – if this option is chosen, then there is no deduction made for risk of nutrient variation (d) above.

Pricing a standing hay crop spreadsheet tool

A spreadsheet tool is available to assist with calculating a buyer's breakeven price for a standing crop. That price is the ceiling, or highest price a buyer could pay in order to breakeven with the assumed costs and risks. The spreadsheet is available at https://forages.osu.edu/forage-management/forage-economics

Setting the final price

Setting the final, fair price for a hay crop rests on an understanding of the needs of both the buyer and the seller. It is critical that both parties agree on price, payment method and timing, crop yield measurement, restrictions, and similar details ***before the crop is harvested!*** Ideally, the agreement should be in writing and signed by both parties. These agreements are especially important when large quantities of crops (and money!) are involved. While this type of contracting maybe uncomfortable for some producers, mainly because they are not used to conducting business on more than a handshake, it forces the parties to discuss issues up front and minimizes troubling misunderstandings after harvest.

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