

## **Estimating Hay Value Based on Chemical Analysis\***

### **Objective**

The objective of feed evaluation is to provide a rapid and economical method to determine the nutrients available (nutritional value) in a feed. This decision aid estimates the economic value of a hay sample based on its percent total digestible nutrients (percent TDN) and crude protein (percent CP) content. The value of energy and protein in the hay samples is calculated based on TDN replacement cost from an energy source such as corn and crude protein replacement cost from an alternative source such as cottonseed meal.

The resulting value of the base hay and alternative hay is an approximate value since it does not account for any difference in the efficiency of protein or energy utilization between hay of various qualities or between hay replacement sources of TDN or crude protein. The analysis will, however, calculate an estimated hay value, where the estimated difference in prices between the base and alternative hay can be useful in buying, selling or utilizing hays.

### **Getting Started**

Cells for data entry in the spreadsheet appear in blue on the screen. Values generated by the program are protected so they cannot be accidentally overwritten and the equations erased.

The chemical analysis for TDN and crude protein for both the base hay and alternative hay are entered. An alternative source of TDN such as corn along with its associated price per unit (\$ per bushel in the example), % DM (percent dry matter), CP % DM (percent crude protein on a dry matter basis) and TDN % DM (percent total digestible nutrients on a dry matter basis) are also entered. To make an approximate adjustment of the values calculated using the analysis, the market value of the base hay is specified. Because a producer has more flexibility in addressing either energy or crude protein deficiencies when using supplements as opposed to using hay, and because hay is generally more costly to haul and store than supplements, this adjustment in the calculated values of crude protein and TDN helps in making a “more realistic” comparison between the two alternatives.

### **Results**

The value of the base hay and sample hay is calculated by computing the pounds and value of both the replacement TDN source (for example, corn) and the replacement source of crude protein (for example, cottonseed meal) necessary to replace the pounds of TDN and CP in a ton of hay. A sensitivity table for different levels of sample protein level is provided. A bale weight conversion also facilitates calculation of hay value per bale. The protein cost per pound of the base and alternative hay specified is also shown in graphical form.

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## **Other Aids to the Process**

It is important to know the quality of hay and the relative cost of alternative feed sources as poor quality hay is rarely a bargain. Nutritional feed value is determined by nutrient concentration and nutrient digestibility. Oklahoma State University's Beef Cattle Manual (Table 17.1, page 157) contains average nutrient concentration values for numerous feeds that are common in Oklahoma. Values in the table represent averages from numerous sources, such as the National Research Council's Nutrient Requirements of Beef and Dairy Cattle publications, commercial laboratories, research trials, and other publications. Beef magazine also publishes a Feed Composition Guide that is updated annually.

Producers must recognize that values published in any table are merely typical averages and that variation among grains, oilseeds, byproducts, and in particular forages and roughages can be extreme. Furthermore, various processing methods may also alter the digestibility. For this reason, producers are advised to have their feeds and forages tested for nutrient composition by commercial laboratories.

## **References**

2017 Feed Composition Guide. (2017) Beef.

<http://www.beefmagazine.com/nutrition/2017-feed-composition-tables-use-mix-your-cattle-feed-rations?full=1>

Lalman, D. and D. Doye. Beef Cattle Manual. Cooperative Extension Service, Oklahoma State University, Seventh Edition, 2015.