

Supplemental Feedstuff Selection: Using Value Rather Than Retail Price to Select Supplemental Feedstuffs for Beef Cattle

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Introduction

Feed costs represent the majority of expenses incurred in any production segment of the beef cattle industry. While forages are utilized as the major source of nutrients for beef cattle in Tennessee, forages often do not contain adequate nutrients to support a desired level of production. In these situations, supplementation is often required to achieve production goals.

Although numerous options exist, many factors should be considered when selecting the most appropriate feedstuff to utilize as a supplement. These factors often include availability, logistics associated with transportation, storage and handling characteristics, as well as nutrient content, consistency and retail price. Unfortunately, the latter of these (retail price) is most often the determining factor used to choose between two or more potential feedstuffs. Doing so, however, can be a costly decision.

Real-world Scenario

To illustrate this, Table 1 provides a comparison of the retail price of four feedstuff options: A, B, C and D. When retail price is expressed per unit of purchase, option A appears to be the cheapest of the four options, due to fewer pounds per unit of purchase. When retail price is expressed per pound of supplement, using Equation 1, as shown in Example 1 and Table 1, option B appears to be the cheapest of the four options, due to the lower retail price per pound of supplement.

It is important to note that retail price does not take into account the nutrient content of a feedstuff, and thus does not provide an accurate indication of its value. When evaluated solely on retail price, the cheapest option may not be the most economical option. Due to the differences in crude protein (CP) content, one would need to feed 1.75 times the amount of options B or D to provide the same amount of CP as options A or C.

Table 1. Retail price comparison of four supplemental feedstuff options

Option	CP content (% as-fed)	Unit of purchase (lbs)	Retail price (\$/unit)	Retail price (\$/lb)
A	28	200	\$75.00	\$0.38
B	16	2,000	\$160.00	\$0.08
C	28	2,000	\$180.00	\$0.09
D	16	2,000	\$235.00	\$0.12

Alternatively, calculating cost per unit of nutrient adjusts retail cost for nutrient content, and thus provides an unbiased indicator of feedstuff value. When evaluated on a cost per unit of nutrient basis, the cheapest option is the most economical option.

Necessary Information

In order to calculate cost per unit of nutrient, it is necessary to first obtain retail price and nutrient content information for the feedstuff options to be included in the comparison. Many factors other than retail price also influence the overall cost of a supplemental feedstuff. Such factors include transportation, as well as additional storage, handling and feeding accommodations.

The degree to which these factors affect overall cost varies widely across operations. Some factors may increase cost, while others decrease cost. In order to account for these additional expenses, the dollar value of each of the factors should be added to the retail price of the respective feedstuff. Keep in mind that some of these expenses may be unique to each option.

Another factor that affects value but is more difficult to quantify is the inclusion of certain technologies, such as medicated and/or nonmedicated feed additives, intake limiters or micronutrients that may not be available in other options. Nonetheless, it is important to consider their value and potential return on investment when determining the cost of supplemental feedstuffs.

Calculations and Conversions

Amount of nutrient per pound of feedstuff: In order to evaluate cost per unit of nutrient, it is first necessary to calculate the amount of nutrient that is provided per pound of feedstuff. For nutrients that are reported as a percentage of the feedstuff, such as CP and total digestible nutrients (TDN), this can be calculated by dividing the percentage of the feedstuff that is the respective nutrient by 100. For example, option A is 28 percent CP, meaning that 1 lb contains 0.28 (or $28 \div 100$) lbs of CP.

If the nutrient is expressed on a per pound of feed basis, such as is the case for net energy for maintenance (NEM), gain (NEG) and lactation (NEL), no calculation is necessary. This is a result of these measurements of energy being reported on a megacalorie (Mcal) per pound of feed basis. For example, if option C contained 0.90 Mcal/lb of NEM, no calculation is necessary because this value is already reported on an amount of nutrient per pound of feed basis.

For this calculation, it is important for these values to be reported on an as-fed (AF) basis. This is the standard method of reporting used for feed tags and labelling in the United States.

Equation 1 and Example 1: Calculating retail price, expressed per lb of supplement

$$\text{Retail price, expressed per lb of supplement} = \frac{\text{retail price per unit of purchase}}{\text{lbs per unit of purchase}}$$

$$\text{Option A} = \frac{\$75.00 \text{ per unit of purchase}}{200 \text{ lbs per unit of purchase}} = \$0.38 \text{ per lb}$$

$$\text{Option B} = \frac{\$160.00 \text{ per unit of purchase}}{2000 \text{ lbs per unit of purchase}} = \$0.08 \text{ per lb}$$

$$\text{Option C} = \frac{\$180.00 \text{ per unit of purchase}}{2000 \text{ lbs per unit of purchase}} = \$0.09 \text{ per lb}$$

$$\text{Option D} = \frac{\$235.00 \text{ per unit of purchase}}{2000 \text{ lbs per unit of purchase}} = \$0.12 \text{ per lb}$$

Equation 2 and Example 2: Calculating cost per unit of nutrient

$$\text{Cost per unit of CP} = \frac{\text{cost per lb of supplement}}{\text{amount of nutrient per lb of supplement}}$$

$$\text{Option A} = \frac{\$0.38 \text{ per lb of supplement}}{0.28 \text{ lbs of CP per lb of supplement}} = \$1.36 \text{ per lb of CP}$$

$$\text{Option B} = \frac{\$0.08 \text{ per lb of supplement}}{0.16 \text{ lbs of CP per lb of supplement}} = \$0.50 \text{ per lb of CP}$$

$$\text{Option C} = \frac{\$0.09 \text{ per lb of supplement}}{0.28 \text{ lbs of CP per lb of supplement}} = \$0.32 \text{ per lb of CP}$$

$$\text{Option D} = \frac{\$0.12 \text{ per lb of supplement}}{0.16 \text{ lbs of CP per lb of supplement}} = \$0.75 \text{ per lb of CP}$$

DM-basis to AF-basis: Although not necessary for calculating cost per unit of nutrient, some other situations may require comparing the nutrient content of multiple feedstuffs expressed on a DM-basis. Nutrient content expressed on an AF-basis can be converted to a DM-basis by dividing the nutrient content by the DM content. For example, if option C contains 28 percent CP on an AF-basis, and its DM content is 90.9 percent, the CP content expressed on a DM-basis would be 30.8 percent (or $28 \div 0.909$).

Cost per unit of nutrient: Once nutrient content information reported on an AF-basis has been obtained, cost per unit of nutrient can be calculated using Equation 2, as illustrated in Example 2. Calculating the cost per unit of nutrient for all of the options in this scenario revealed that option C is the most economical source of CP, as it has the lowest cost per unit of CP.

This is further illustrated by Example 3 (calculated using Equation 3), which shows the cost that would be incurred in order to purchase 0.5 lbs of supplemental CP for each of the options. Thus, cost per unit of nutrient is the recommended method of evaluating the value of supplemental feedstuffs for beef cattle and is essential to selecting the most economical option.

Available Tools

Although comparing the cost per unit of nutrient of a small number of supplemental feedstuff options by hand is not very time consuming or difficult, comparing numerous options or conducting comparisons on a regular basis may become tedious. The University of Tennessee has developed two calculators in order to streamline this process that are available for free download.

The first of these web publications (W 373), titled “Supplemental Feedstuff Value Calculator,” is intended to be used to calculate and compare the cost per unit of nutrient for different supplemental feedstuffs. The second (W 374), titled “Wet-dried-modified Byproduct Value calculator,” is intended to be used to calculate and compare the cost per unit of nutrient for byproduct feedstuffs that are similar in type, but differ in form or moisture content.

Both calculators are Excel-based downloads that can be accessed through the UT Beef and Forage Center at UTBeef.com, or by visiting the website URLs listed at the end of this document. Each calculator includes detailed operating instructions and can be used to calculate the cost per unit of nutrient of feedstuffs with known nutrient content that is reported on either an AF- or DM-basis.

Equation 3 and Example 3: Calculating the cost of purchasing a certain amount of supplemental nutrient

$$\text{Cost per unit of supplemental nutrient} = \frac{\text{Desired amount of supplemental nutrient}}{\text{lbs of nutrient per lb of supplement}}$$

$$\text{Option A} = \frac{0.5 \text{ lbs of CP}}{0.28 \text{ lbs of CP per lb of supplement}} \times \$0.38 \text{ per lb of feed} = \$0.68$$

$$\text{Option B} = \frac{0.5 \text{ lbs of CP}}{0.16 \text{ lbs of CP per lb of supplement}} \times \$0.08 \text{ per lb of feed} = \$0.25$$

$$\text{Option C} = \frac{0.5 \text{ lbs of CP}}{0.28 \text{ lbs of CP per lb of supplement}} \times \$0.09 \text{ per lb of feed} = \$0.16$$

$$\text{Option D} = \frac{0.5 \text{ lbs of CP}}{0.16 \text{ lbs of CP per lb of supplement}} \times \$0.12 \text{ per lb of feed} = \$0.38$$

Supplemental Feedstuff Value Calculator:

<https://www.utbeef.com/Content%20Folders/Beef%20Cattle/Nutrition/Publications/W373%20supplemental%20feedstuff%20value%20calculator.xlsx>

Wet-Modified-Dried Byproduct Value Calculator:

<https://www.utbeef.com/Content%20Folders/Beef%20Cattle/Nutrition/Publications/W374%20wet-modified-dried%20byproduct%20value%20calculator.xlsx>



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