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Dairy Guidelines

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What Are My Forages and Grains Worth?

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Balanced rations, whether forages or concentrates, can be made up of various combinations of feed ingredients. Arriving at the least-cost combination of ingredients that will meet specifications requires an analysis of relative values. Forages and grains can be evaluated on the basis of the value of concentrates they substitute for in the rations. In dairy rations, for example, hay would be worth the value of concentrates it replaces within certain limits. It is recognized that when cattle are fed large amounts of fibrous feeds (such as hay) with small quantities of concentrate, additional hay has a lower value than when small quantities of hay are fed with large quantities of concentrates. Also, values of a particular feed ingredient may differ for various classes of farm animals. The cow's stomach capacity and inherent production ability also limit the amount of forages an animal can utilize economically.

In placing a value on replaced concentrate, it is necessary to consider the net energy content (the energy remaining after energy used in the digestion process is taken out) and the digestible protein. Using this approach, hay or silage is worth the value of the digestible protein in a balanced ration it substitutes for, plus the value of net energy in the other digestible nutrients it substitutes for. If more protein is fed than is needed, the excess does not have a normal value since cattle will convert it to energy which has less value than protein.

To compare the value of forages with concentrates, it is necessary to take into account the estimated net energy and digestible protein in the forage being considered. Many farmers are now receiving forage tests through the forage testing program. These tests can furnish a basis for placing value on a specific forage.

Using a mathematical procedure, a value is placed on digestible protein (D.P.) and other digestible nutrients (O.D.N.) based on varying prices of commonly used 44% soybean oil meal and ground, shelled corn.

Table 1 gives the value per pound of (D.P.) and (O.D.N.) with various price combinations.

Table 1. The Value of Digestible Protein and Other Digestible Nutrients with Various Price Combinations of Shelled Corn and 44% Soybean Oil Meal

Price of Soybean Oil Meal		Price of Ground Shelled Corn Bu.		
		\$1.00	\$1.25	\$1.50
\$5.25 cwt.	D.P. ^{1/}	11.3¢	10.7¢	10.2¢
	O.D.N. ^{2/}	1.4	2.1	2.7
\$5.00 cwt.	D.P.	10.7	10.	9.5
	O.D.N.	1.5	2.1	2.8
\$4.75 cwt.	D.P.	10.0	9.4	8.9
	O.D.N.	1.5	2.2	2.9
\$4.50 cwt.	D.P.	9.4	8.8	8.2
	O.D.N.	1.6	2.2	2.9

^{1/} D.P. = Digestible Protein

^{2/} O.D.N. = Other Digestible Nutrients (Net Energy minus Digestible Protein)

When soybean oil meal is selling at \$5.25 cwt. and corn is selling at \$1.00 bu., 1 lb. of digestible protein is worth about 8.1 therms of other digestible nutrient (11.3¢ ÷ 1.4¢). When soybean oil meal sells for \$4.50 cwt. and corn at \$1.50 bu., 1 lb. of digestible protein is worth a little more than 2.8 therms of other digestible nutrient (8.2¢ ÷ 2.9¢).

Steps in placing a value on feed using estimated net energy from forage test sheet are:

1. Calculate therms net energy per unit (ton or cwt.).
2. Calculate lbs. digestible protein per unit and subtract from therms per unit, giving other digestible nutrients.
3. Multiply pounds digestible protein per unit by value per pound chosen from Table 1.
4. Multiply O.D.N. (secured from step 2 above) by value per pound or therm chosen from Table 1.
5. Add value of (D.P.) and (O.D.N.) values calculated from steps 3 and 4, giving value per unit of feed.

The following corn silage example is based on an assumed forage test. It is assumed there are 18 therms of net energy per cwt. and 1.3% of digestible protein; using the values for (D.P.) and (O.D.N.) for \$5.00 cwt. soybean oil meal and \$1.50 bu. ground shelled corn (taken from Table 1).

$$\begin{aligned} 20 \text{ cwt.} \times 18 \text{ therms cwt.} &= 360 \text{ therms per ton} \\ 20 \text{ cwt.} \times 1.3\% \text{ digestible protein} &= \frac{26}{334} \text{ lbs. digestible protein} \frac{3/}{\text{therms other digestible nutrients}} \end{aligned}$$

			<u>Value per Ton</u>
26 lbs. (D.P.)	x 9.5¢ lb.	=	\$2.47
334 therms (O.D.N.)	x 2.8¢ therm	=	<u>9.35</u>
Estimated value of this corn silage per ton =			\$11.82

Alfalfa hay example:

10% digestible protein
35 therms estimated net energy per cwt.
\$5.00 cwt. 44% soybean oil meal
\$1.50 bu. ground shelled corn

$$\begin{aligned} 20 \text{ cwt.} \times 35 \text{ therms cwt.} &= 700 \text{ therms per ton} \\ 20 \text{ cwt.} \times 10\% \text{ digestible protein} &= \frac{200}{500} \text{ digestible protein} \frac{3/}{\text{therms}} \\ \text{Other digestible nutrients} &= 500 \text{ therms} \end{aligned}$$

			<u>Value per Ton</u>
200 lbs. (D.P.)	x 9.5¢ lb.	=	\$19.00
500 therms (O.D.N.)	x 2.8¢ therm	=	<u>14.00</u>
Value of 1 ton of this quality hay			= \$33.00

3/ Assumes a therm energy in each pound digestible protein.

When comparing values of various concentrate feed ingredients, total digestible nutrients (T.D.N.) and digestible protein can be used safely.

Wheat bran example:

$$\begin{array}{rcl} & 66.9\% \text{ (T.D.N.)} & \\ & 11.8\% \text{ (D.P.)} & \\ 100 \text{ lbs.} \times 66.9\% \text{ (T.D.N.)} & = & 66.9 \text{ lbs. (T.D.N.) cwt.} \\ 100 \text{ lbs.} \times 11.8\% \text{ (D.P.)} & = & \underline{11.8 \text{ lbs. (D.P.) per cwt.}} \\ \text{(O.D.N.)} & = & 55.1 \text{ lbs. per cwt.} \end{array}$$

			<u>Value per cwt.</u>
11.8 lbs. (D.P.)	x	9.5¢ lb.	= \$1.12
55.1 lbs. (O.D.N.)	x	2.8¢ lb.	= <u>1.54</u>
Value of cwt. wheat bran when ground shelled corn is \$1.50 bu. and 44% soybean oil meal is \$5.00 cwt.			= \$2.66

If forages or concentrates substitute for a cheaper source of energy and digestible protein than in corn and soybean oil meal, the value of these feeds must be calculated and used as a basis of evaluating forages and other grains. This fact needs special consideration since, within certain limits, corn and urea can be substituted for protein meals in the ration.