

## FORAGE ANALYSIS AND SUPPLEMENTS FOR BEEF COWS

The goal of supplementation is to provide nutrients to the cow that are not available in sufficient quantity, or adequate balance in the forage diet, and to do this in an economical manner. When forage nutrient content meets the cow's requirements, supplementation is not necessary. To decide whether a supplement is needed, a forage sample should be analyzed.

### *How is forage quality measured?*

**Crude protein (CP)** – Forages high in CP are considered high quality forages because little or no protein supplement is needed. In addition, high CP forages are usually more digestible and, consequently, provide more energy to the animal.

**Neutral detergent fiber (NDF)** – Neutral detergent fiber is used to estimate the intake potential of the forage. Forages with a high NDF content are considered to be lower in quality, and forage intake is generally lower compared to low NDF forages. Forage dry matter intake (as a % of body weight) can be estimated by the following equation:

$$\text{Intake, \% BW} = (120 / \% \text{ NDF})$$

**Acid detergent fiber (ADF)** – Most laboratories use ADF to estimate the digestibility and energy value (TDN) of forage. Forages with a high level of ADF are less digestible, and have a lower energy value. Using the ADF value, forage digestibility or TDN content can be estimated by the following equation:

$$\text{TDN, \%} = 88.9 - (0.779 \times \% \text{ ADF})$$

### *How can a forage analysis be used to determine supplement needs?*

A producer whose cows weigh approximately 1,200 lbs and are in condition score 5 sends a forage sample to a lab for analysis, and receives the following results.

#### Example Forage Analysis

Nutrient	%
DM	88.0
Crude protein	7.5
NDF	65.0
ADF	36.0

### *Forage intake and protein intake can be estimated from the lab analysis*

$$\text{Intake, \% BW} = (120 / \% \text{ NDF})$$

$$\text{Intake, \% BW} = (120 / 65) = 1.85 \%$$

1,200 lb cow x 0.0185 = **22.2 lb DM intake**

22.2 lb intake x 0.075 CP = **1.67 lb CP**

*Forage energy value and TDN intake can be estimated from the lab analysis*

TDN, % = 88.9 - (0.779 x % ADF)

TDN, % = 88.9 - (0.779 x 36) = 60.9 %

TDN intake = 22.2 lb intake x 0.609 = **13.5 lb TDN intake**

**If you can't estimate forage intake from a lab analysis, then use the rule of thumb of 2% body weight for forage intake. (1,200 lb cow x 0.02 = 24 lb forage DM intake per day)**

*Are requirements being met?*

### Nutrient Requirements of 1,200 lb Beef Cows

Stage of production	CP	TDN
Mid-gestation	1.5 lb	10.0 lb
Late gestation	2.0 lb	13.5 lb
Lactation	2.75 lb	16.0 lb

*Is a protein or energy supplement needed?*

Both "protein" and "energy" supplements contain protein **and** energy. The difference between the two is the relative concentration of protein. Protein supplements generally contain 25% CP or greater. Energy supplements usually contain less than 15% CP. The term "energy supplement" generally refers to either cereal grains or by-products of the grain milling industry. Energy supplements can be classified into those high in non-structural carbohydrates (starches and sugars), or those high in structural carbohydrates (cellulose, hemicellulose, and lignin).

Examples of energy supplements containing high levels of non-structural carbohydrates are corn, barley, sorghum grains, and molasses-based liquids or blocks. Examples of energy supplements containing high levels of structural carbohydrates are soybean hulls, wheat middlings, beet pulp, and alfalfa hay. Which type of supplement (protein or energy) should be used? The answer to this depends on **which nutrient is first limiting**.

*Calculating the first limiting nutrient*

To determine whether protein or energy is first limiting, divide the amount of protein supplied per day by the amount of protein required per day, and divide the amount of TDN supplied per day by the amount of TDN required per day. In the example given above, for lactation requirements, the cow requires 2.75 lb CP and 16.0 lb TDN per day. If fed the hay given above as an example, the cow would be getting 1.67 lb CP and 13.5 lb TDN per day.

CP supplied, 1.67 lb / CP required, 2.75 lb = 0.61 or 61% of her CP requirement is being met.  
TDN supplied, 13.5 lb / TDN required, 16.0 lb = 0.84 or 84% of her TDN requirement is being met.

Therefore, the first limiting nutrient in this example is CP, so we would choose a CP supplement.

***How much supplement to feed?***

To determine how much supplement is needed, we need to know the CP content of the supplement we are going to use, and how much CP we need the supplement to supply.

CP required = 2.75 lb

CP supplied from hay = 1.67 lb

CP needed from supplement = 2.75 lb – 1.67 lb = 1.08 lb

Commercial range cube supplement = 28% CP

1.08 lb CP needed / 0.28 = 3.85 lb supplement needed per day

So, if we use the 28% CP commercial range cube supplement, we would need to feed 3.85 lb of the supplement per cow per day, in addition to the hay, to meet the CP requirements.