



Got Protein?

Protein sources prove beneficial when grazing low-quality forages.

by **Kindra Gordon**

Protein tends to be a buzzword in human diets, particularly among those who are limiting carbs and wanting a nutritional boost.

But protein sources should also be top-of-mind among producers as a supplement to their cattle when animals are grazing low-quality forages — such as dormant grass or crop aftermath.

Why? South Dakota State University Animal Science Professor and Extension Beef Specialist Ken Olson explains that without protein to help stimulate rumen microbes for fiber digestion, the process can be slowed down — and a cow's intake can decrease threefold.

Supplementing thin cows?

In situations when supplemental energy may be needed, such as for thin cows that need to gain weight or young cows that are still growing, South Dakota State University's Ken Olson advises feeding a fiber-based energy supplement instead of a starch-based supplement such as grain. Soyhulls, sugar beet pulp and wheat middlings are high in digestible fiber and have little to no starch.

Olson explains that fiber-based energy supplements will not have a negative effect on microbes in the rumen and will not create a competition between starch and fiber for preferential digestion. **HW**

Ruminant basics

Olson says producers should have an understanding of how digestion occurs in a ruminant to truly understand the need for supplemental protein. Ruminants are able to digest forage fiber because of their four-compartment stomach, and specifically because of the microbes in the reticulum and rumen.

Olson explains that the microbes provide enzymes that allow for fermentation of fiber, which is broken down into energy and ultimately has a dual role. "The energy feeds the microbes to continue supporting their digestive process and the volatile fatty acids (VFA) created from rumen fermentation are absorbed and used as an energy source by the animal," Olson says. He adds, "Producers should remember they are feeding for [these] two — the cow and the microbes."

To help producers better understand this process, Olson suggests picturing the fermentation vat (rumen) like a water tank. He says, "Cows have receptors to stop feed or forage intake when the 'tank' is full. They then need to digest the feed in the tank through chewing of the cud to get particles smaller and microbial action. The only way feed leaves the rumen is

if it fits through a small hole into the omasum. When the rumen empties, the cow will eat again."

However, when the forage being consumed is high fiber and low protein, from low-quality forages, it often slows this digestion process down, says Olson. He adds, "There are two bad things going on with low-quality forages — the cow eats a lot fewer pounds and there are less nutrients in what she eats."

This is the time where a supplement may be beneficial to the cow to help overcome those two limitations.

Protein vs. energy

Olson says, "Ruminants can digest the fiber as an energy source. There's energy out there. What's needed as a supplement on low quality forage is protein."

He explains that protein supplements provide nitrogen for rumen microbe growth. This in turn promotes improved fiber digestion which increases the rates of digestion and passage through the four-compartment stomach. When this digestion process is working efficiently, it ultimately supports increased intake of low quality forage by the animal.

Olson emphasizes that protein supplementation can increase

the intake and nutritional value of low quality forages whereas grain-based energy supplements (like corn) that are high in starch and low in protein have a negative effect on forage intake and digestibility. And, high-starch energy feed supplements can shift the fiber-fermenting bacteria in the rumen to starch-fermenting bacteria — exacerbating the decrease in microbes capable of digesting fiber.

"Microbial growth is not stimulated when starch is fed to cattle on low quality forages and there is a negative associative effect on digestion. Forage intake is actually decreased, which also limits energy intake," says Olson.

He reports that research data studying forage utilization by cattle have almost universally shown negative effects from low-protein supplements and positive effects from high-protein supplements.

Supplement strategies

In determining when to supplement protein, Olson suggests forages offering less than 7% crude protein should be the threshold. Previous research suggests 7% crude protein is the minimum in cattle diets to maintain rumen microbial function so forage fiber can be digested.

Olson advises testing forages for nutritional content so producers know what nutrients are available to their cows and what supplements may be needed. He cautions that not all dormant forage or crop aftermath is the same, and some will have higher crude protein content.

Protein supplements to consider, according to Olson, might include soybean meal or cottonseed meal, with a crude protein content of 49% and 46% respectively. (For comparison, corn is only 9% crude protein.) However, he notes that distillers' grain, wheat middlings and corn gluten feed are also good protein supplement options with a slightly lower crude protein content and potentially less expensive.

Regarding pricing, Olson says feedstuffs should be compared on an equal crude protein basis, which means adjusting for differences in feed price, crude protein content and dry matter content. (Cost per unit of crude protein can be calculated by dividing the price of the feedstuff by the dry matter and crude protein contents in decimal form (e.g. soybean meal CP \$/ton = \$500 ÷ .89 ÷ .49 = \$1,147.)

That said, Olson notes that cost of delivery must also be considered. As an example, with distillers' grain, transportation of dried is typically less expensive; however, Olson says, "If you live within about 60 miles of an ethanol plant, wet may pencil out." **HW**