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# Become More Supplement Savvy

## Understanding ruminant digestion, nutrient content and price of feedstuffs are all important factors in selecting cow herd supplements.

*by **Kindra Gordon,** field editor*

When green grass goes dormant — either due to drought or winter weather, supplementing the cow herd with additional feedstuffs while they are on pasture may become a necessity. A few basic rules of thumb can help producers ensure they get the "best bang for the buck" on the extra dollars they are spending on feed, according to South Dakota State University (SDSU) animal science professor and extension beef specialist Ken Olson.

Olson emphasizes, "The first rule of supplementation is to use supplements only if needed and when they will enhance the nutritional value of the base forage."

When supplementation is deemed necessary, Olson says there are two aspects to consider: biology and economics. He explains that from a biology standpoint you want to use the right feeds to provide the right nutrients for the animal. Additionally, economically, you want to choose supplemental feeds that offer the best price for the right nutrients.

"Both aspects are really important to maximize the value of your supplement program. It's not one or the other," says Olson.

### Ruminant basics

Before assessing what type of nutrients and supplements will be beneficial to the cow, Olson says producers should have an understanding of how digestion occurs in a ruminant. He points out, "The beauty of ruminants is that they can digest fibrous feeds that non-ruminants cannot."

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 explains. "Producers should remember they are feeding for [these] two."

To help producers better understand this process, Olson suggests picturing the fermentation vat (rumen) like a water tank.

"Cows have receptors to stop feed or forage intake when the 'tank' is full," he says. "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."

When the feed being consumed is high-fiber — and low-protein — from low-quality forages, it often slows this digestion process down, says Olson. In fact, the cow's intake can decrease by threefold.

"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," he adds.

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

## Protein vs. energy

With this understanding of ruminant nutrition, producers should recognize that fibrous forage is an energy source to the animal — and the supplement that will be most beneficial is protein.

He explains that protein supplements provide nitrogen for rumen microbe growth. This in turn promotes improved fiber digestion, which increases the rate 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. Plus, high-starch energy 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. It's like feeding a Snickers® bar vs. a celery stick," says Olson.

He reports that research on forage utilization by cattle has 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 (CP) should be the threshold. Previous research suggests 7% CP 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 therefore 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, which have a crude protein content of 49% and 46%, respectively. (For comparison, corn is only 9% CP.) However, he notes that distillers' grains, wheat middlings and corn gluten feed are also good protein supplement options with a slightly lower crude protein content and are potentially less expensive.

"The important thing is to look at the nutrient profiles," says Olson. He reiterates that crude protein content can vary widely between feedstuffs. Total digestible nutrients (TDN) provides information on energy content provided, and TDN can be highly variable as well.

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, Olson advises feeding a fiber-based energy supplement instead of a starch-based supplement such as grain. Soyhulls, sugar beet pulp or 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.

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 (DM) content. [Cost per unit of crude protein can be calculated by dividing the price of the feedstuff by the DM and CP contents in decimal form (e.g., soybean meal CP $ per ton = $500 ÷ 0.89 ÷ 0.49 = $1,147)].

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

**Editor's Note:** *Kindra Gordon is a freelance writer and cattlewoman from Whitewood, S.D.*

### Urea and alfalfa: alternative protein supplements

To reduce protein supplement costs, South Dakota State University's Ken Olson says using nonprotein nitrogen (NPN) such as urea or feeding alfalfa hay may offer options.

He notes that urea is inexpensive and is a highly soluble source of nitrogen that is usable by rumen microbes as long as they have adequate carbohydrates available to serve as the rest of the structure of the microbial protein they build.

Urea is often included in commercial protein feeds such as pellets, blocks, tubs and liquid feeds.

However, Olson explains that the caveat with urea is that the nitrogen is released very quickly when it is consumed — so only a limited amount of the nitrogen from urea can be utilized in the rumen before it escapes.

Because of this, Olson advises that only a portion of protein supplements (about 30%) should rely on urea in protein supplements for low-quality forages, with the rest being from actual protein.

Additionally, high-protein forage legumes, such as alfalfa, which averages about 17% crude protein, can be an effective source of supplemental protein when hay prices make it economical.

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