

# FEED FOR THOUGHT



Production Information For Florida Cattlemen From Suga-Lik®, A Product Of U.S. Sugar Corp.

## Do You Supplement the Cow or the Rumen Microbes?

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Ruminant or “cud chewing” animals are unique in the animal kingdom in that they have a four compartment stomach. The first compartment, or rumen, comprises about 80% of the total “stomach” capacity of the cow. The rumen is comparatively large, often about 30 gallons of capacity in a mature cow. The rumen is a “fermentation vat” which houses billions of microscopic organisms (bacteria and protozoa). In 1884 the German scientist Tappeiner discovered that bacteria obtained from the rumen of an ox were capable of digesting the fiber fraction of plant material. That’s important because approximately 70% of the composition of grasses is fiber. Shortly thereafter scientists began studying the relationship between microorganisms within the rumen of the cow to the overall nutrition of the cow. Over time ruminant nutritionists have learned to appreciate the “symbiotic” or mutually beneficial relationship between rumen microorganisms and their host cattle. Ruminant animals, such as cattle, are extremely valuable to mankind because of their ability to convert indigestible fiber (from forage) to high quality food proteins (meat and milk). Cattlemen should be proud of their lofty position in the food chain.



Feedstuffs flow into the rumen and liquid, bacteria and undigested feed residues flow out. The remaining ruminant stomach compartments consist of the reticulum, omasum and abomasum. Enzymatic activity and various nutrient absorptions increase along the tract and on into the small intestine. There is one last fermentation site in the cecum and bowel for material that has been resistant to or escaped previous digestion. The ruminant animal is a fairly efficient digestive system. However, remember that the modern, economically productive cow can not thrive on forage alone.

At the tissue level all animals have a requirement for specific and essential amino acids that are the individual components of protein.

In addition, essential minerals, vitamins, fatty acids, and a source of glucose (energy) and water are required. The extent to which the individual amino acid composition of a protein source meets the cow’s amino acid requirement is determined by how much of that protein is fed, the amino acid makeup of the protein source, the amount of the protein metabolized by the rumen microbes to produce additional microbial cells, and the extent of digestibility of the protein in the intestine of the cow. The amino acid composition of the microbial cells approaches “perfection” relative to the cow’s tissue and milk production requirement. Also noteworthy is that rumen microbes are capable of converting virtually any source of nitrogen (including urea and ammonium sulfate) into microbial cell protein of equally desirable amino acid composition. **Take home message: Rumen microbes convert poor quality protein and relatively economical sources of nitrogen (such as urea) into high quality protein with a desirable amino acid composition (assuming we provide them with adequate nitrogen!).**

Rumen microbes also produce various “cellulase” enzymes that are not produced by the cow. These are the enzymes that make it possible for the microbes to utilize the fiber in forage to produce energy for the

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synthesis of microbial protein. By-products of this microbial metabolic process include fatty acids. The fatty acids are absorbed by the cow and converted to glucose and fat by the cow. **Take home message: Rumen microbes convert fiber to energy sources readily utilized by the cow.**

Rumen microbes DO synthesize the B vitamins and vitamin K essential to the cow. They DO NOT synthesize the essential vitamins A, D and E. **Take home message: It is important to provide the cow with vitamins A, D, and E (See Feed for Thought, Summer 2006).**

Rumen microbes DO NOT synthesize minerals essential to BOTH the rumen microbes and the cow. **Take home message: It's important to provide all the essential minerals in forms that are readily available to the rumen microbes AND the cow.**

So what's in this "symbiotic" relationship for the rumen microbes?

- The predominant final product of the breakdown of protein and other nitrogen substances in the tissues of the cow is urea. Some of this urea is excreted in the urine and some is recycled to the rumen (via the saliva) to provide a source

of nitrogen for the microbes to synthesize high quality microbial protein.

- Minerals essential for microbial growth such as phosphorus, sodium, potassium and other minerals are recycled to the rumen via saliva to provide minerals essential for microbial growth.
- The recycling of minerals also provides an important "buffering" of the rumen fluid to maintain a relatively constant "pH" or level of acidity that's important for maximum microbial growth.
- Rumen microbes require a relatively warm and constant temperature for optimum growth. The cow provides that environment in a well insulated rumen structure within her body.
- Rumen microbes require a relatively constant moisture level for optimum growth. The cow provides that via drinking water and recycling of water from the cow into the rumen.

#### The Bottom Line:

High levels of microbial activity are essential for maximum fiber digestibility and provision of energy, some vitamins and high quality

microbial protein to the cow. This is essential to maximize forage utilization and thereby maintain acceptable body condition scores and good reproductive performance. The effective way to supplement grazing, productive cattle is to provide nutrients required by both the rumen microorganisms and their host cow. Our Suga-Lik® Fully Fortified® supplements are formulated:

- in an environmentally responsible manner
- with consideration of the composition of the forage grazed
- and the requirements of BOTH the rumen microbes and the cow— regardless of the season!

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