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haylage may see rumen pH fall six to 14 hours after feeding. The hydrogen sulfide gas is then more acceptable, and cattle have the best gain," says Fluharty, citing feedlot research.

Coproduct particle size is another consideration. A big difference exists between corn kernel and dried distillers' grains sizes, for example. Fluharty recommends a smaller particle size for quicker movement through the rumen, as propionate increases glucose production, which means better average daily gain and marbling. Dried distillers' grains can be 20%-60% of the ration.

"Between 20% and 40%, there is no difference in average daily gain. Average daily gain and feed to gain are better at a 40% dried distillers' inclusion rate than at zero versus an all-corn diet," says Fluharty. "About 25% is good. But at 50%, protein and sulfur may be too high. Crude protein also is a negative, depending on how you value and handle manure. While there are no differences in marbling scores or ribeye, more research needs to be done before we can recommend more than 40% distillers' grains be fed."

Fluharty adds corn gluten is another option that is 80% ruminally degradable and improves fiber digestibility. Soy hulls are highly digestible, and used for fiber, but not energy or protein.

Manage for proper protein digestion

Providing the right protein source improves forage digestion and animal performance. Fluharty told producers the goal with protein is to feed the bacteria in the rumen. Microbial protein provides 50% of the amino acids used by an animal on a forage diet, and 80% of the amino acids needed for an animal on a high-grain diet.

"Ruminant animals in grazing situations need to maximize forage digestion in order to increase performance parameters such as average daily gain or milk production," he says. "Ruminally speaking, degradable intake protein is the first limiting nutrient for beef cattle grazing low-quality forages. Highly available protein sources are urea, soybean meal and corn gluten feed."

Nitrogen is needed for microbial growth and fermentation in the rumen, and is broken down into ammonia. Fluharty says some combination of proteins is needed to maintain ammonia.

"From a cost and protein percentage standpoint, there is never a cheaper or higher protein source than urea in a high-grain diet," he says. "Substituting urea for a portion of degradable, true protein in supplements for range cows is a viable option. It also has applications for growing diets that are high in forage, as long as forage is adequate to accompany a lick tank with urea."

Fluharty says urea is the most misunderstood protein supplement available, noting it is used most efficiently on high-energy, low-protein diets where there are readily available carbohydrates. Urea increases diet organic matter digestion with straw and increases microbial protein synthesis.

"When urea is fed, sulfur, potassium and phosphorus must be supplemented or available in sufficient quantities. If you are feeding any distillers' grains, you may already have enough phosphorus. You need to check the rest of the ration for those minerals," he says.

Producers also must be aware urea can create ammonia toxicity and reduce feed intake. Fluharty advises never exceeding 1% of diet dry matter and one-third of the total dietary protein with urea. Overfeeding urea can increase rumen pH and lead to ammonia toxicity.

"Don't use urea in less than 300-pound calves or on highly stressed newly arrived feedlot cattle, either," he says. "The first three to four days, cattle are getting used to a new feed. For receiving calves with no urea, use soybean meal to provide ruminant-available nitrogen."

Other concerns with nutrient sources include heat-damaged proteins from the milling process. Any browning creates

High-value niche may be best for U.S. beef

U.S. beef producers may find the best future bang for their buck is to concentrate on producing high-value, top-quality meat for home and abroad. As part of a recent webinar series on minimizing feeding costs, Ohio State University ruminant nutrition professor Francis Fluharty told producers that to know what they must produce, they must understand consumer demand.

"What is our role? The U.S. needs to be the high-value producer. We are not the biggest kid on the block, but we have the highest quality," he says. "There will be 400 megacities by 2050, mostly in Asia, compared with two megacities in 1950. We are adding 51 million middle-class consumers per year, primarily in Asia, and they have an interest in high-quality beef."

Per capita beef consumption currently is highest in Uruguay, followed by Argentina, Brazil and the United States. Top-value beef markets are Japan, Hong Kong, Canada, Mexico and South Korea.

"We only export about 25% of our middle-meat cuts. End meats are the rest of the volume, and consumers in these countries want fat and flavor," he says. "Big packers allow for this export market to succeed and add hundreds of dollars to cattle prices because they are able to ship not only all of the demanded cuts, but also the byproducts worldwide."

Yet, as demand rises, U.S. beef inventory is at its lowest level in 50 years. Fluharty says cow herds are shrinking in the Midwest, Southeast and Southwest and expanding in the Upper Plains and Northwest. As U.S. inventory declines, the Brazilian cattle herd is growing. Brazil is the second-largest producer with 190 million head, compared with 92 million head in the United States.

"Brazil has several cow herds with more than 20,000 head. They are looking at better fertility and are adding Angus and other English breeds into their mix," says Fluharty. "Where row crops occur, livestock production follows in Brazil. Both will increase over the next decade."

While domestic consumers will continue to buy beef for flavor, Fluharty says U.S. consumers are very price-conscious.

"Consumers expect palatability and tenderness, and that drives consumer satisfaction. In addition, the beef industry has expanded to offer all kinds of choices, from natural to all grass-fed and more," he says. "We better listen to our consumers because some element of health and wellness is important to three-quarters of American shoppers."

Fluharty notes that U.S. families with a female head of household 50 years old or older are most likely to purchase branded meat products. Households in the West are more likely to purchase branded meat than in the East.

"Consumers are beginning to look for 100% traceability. Niche markets exist because we have a safe beef supply, good feeding and management technologies, and a packing system that makes money selling byproducts overseas," he says.