QLF QUALITY LIQUID FEEDS

CATTLE SENSE

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Consistency, Continued

Last month I reviewed some basic nutritional principles, all of which reinforce the importance of being able to consistently deliver desired levels of each essential nutrient to our cattle. When the composition of feedstuffs differs from expectations, potential outcomes include:

- ✓ Production restricted to the level supported by a single "first limiting nutrient;"
- ✓ More moisture, and therefore fewer nutrients, in the diet;
- ✓ Reduced dilution of maintenance requirements, accompanied by lowered efficiency; and,
- ✓ Antagonistic effects on rumen function and diet utilization.

Beyond the impact ingredient/feed variability has on our ability to balance cattle diets, inconsistencies can also be the source of several specific concerns. These include the potential to deliver unwanted excess nutrients, create mineral imbalances, lead to mineral toxicities, contain undesirable levels of fat, or be contaminated with mycotoxins.

Feeding Excess Nutrients. From a strictly economic standpoint, it doesn't make sense to pay for something you don't need. Any time feed has more of a needed nutrient in it than expected, there is missed opportunity to save money on diet formulation. Beyond this, though, is the fact there is an energetic cost – and therefore lost efficiency – associated with processing and excreting excess dietary nutrients. For example, energy must be expended internally to operate the biologic cycle that generates urea from unneeded nitrogen. Then, there is the environmental issue of increased nutrient release. Waste management plans are often particularly focused on phosphorus and nitrogen loads, both of which can vary considerably in byproducts fed to cattle. In one study, the phosphorus content of Condensed Corn Distiller's Solubles (CCDS) samples collected across three states varied from 1.3% to 1.8% (Belyea et al., 2006). That is more than a 38% spread, which translates into a difference of 2 ¼ g of phosphorus per every pound fed.

Mineral Imbalances. The relative amounts of individual mineral intakes can be as important as the absolute level consumed. That is because some elements will bind with others, rendering them less available for absorption; this essentially creates a deficiency. Classic examples include high levels of iron tying up zinc and copper, or sulfur complexing with copper. Both iron and sulfur are present in significant and variable concentrations in multiple byproducts and supplements, and need to be monitored. An additional concern is the potential impact on dietary cation-anion balance, especially in dairy cattle. The minerals contributing to calculations of DCAD are typically sodium (Na), potassium (K), chloride (Cl) and sulfur (S). Again, these may all be present in some feeds in inconsistent amounts.

Mineral Toxicities. Many minerals, while absolutely essential at a given level in the diet, are toxic when fed in excess. Often, the potentially toxic element of major concern is sulfur. Recent research from Kansas State University (Uwituze et al., 2011) demonstrated the depression in performance seen with high sulfur diets. When dietary sulfur concentrations went from 0.42 to 0.65% of dry matter, intake was depressed almost 9%, gains were reduced nearly 12%, and carcass weights dropped 40 pounds.

Mineral Toxicity in Beef Steers

	Moderate S Diet	High S Diet	Observed Difference
DM Intake, lb	10.2	9.3	8.9%
ADG, lb	3.52	3.06	11.8%
Carcass Wt, lb	888	848	10%

Uwituze et. al, 2011

At this high level of sulfur consumption, a further concern is death loss due to polioencephalomalacia. Researchers at the University of Nebraska (Vaness et al., 2009) reviewed more than 4000 health records of cattle finished in byproduct experiments. They identified a baseline value of ≤0.46% dietary sulfur (dry matter basis); the incidence of polio among cattle receiving these diets was just 0.13%. When sulfur in the ration was between 0.47 and 0.56% sulfur, the prevalence of polio increased nearly three-fold, but was still only 0.35%. But with "high" sulfur diets – those containing greater than 0.56% sulfur – over 6% of the cattle were impacted.

Going back to the DDGS survey completed by Belyea and co-workers, it is worth noting that the sulfur content of the samples they analyzed ranged from 0.19 to 1.3% sulfur. That was a more than 6-fold difference, meaning animals receiving this ingredient could have gotten anywhere from 0.9 to 6 g of sulfur per lb consumed.

Fat Content. Dietary fat plays a complex role in ruminant nutrition. It appears that, at least in some instances, fat (or possibly specific fatty acids) may have positive nutriceutic effects on reproduction. However, it is well recognized that in forage-based diets, feeding supplemental fat at greater than 2% of diet DM will cause negative associative effects on fiber digestion. Feeds with variable fat content need to be monitored to keep total fat intake within accepted guidelines.

Mycotoxins. These potentially toxic compounds can be produced by molds in grain. They occur in pockets, making it difficult to sample and test for reliably. If the grain used, for example, in dry milling for ethanol production contains mycotoxins, these compounds will end up concentrated in the byproducts. In a study involving samples from nine ethanol plants (Schaafsma et al., 2009), researchers determined that DDGS (Dried Distillers Grains plus Solubles) contained about three times the concentration of mycotoxins than the original grain. This value is commonly cited. But these authors also reported that the concentration in the solubles was even higher, running four times the grain level, and 1.4 times the DDGS. This should be a cause for concern when solubles are fed to cattle, especially when crop conditions are conducive to formation of mycotoxins.

Impacts on Eating Behavior. One of the basic goals of any feeding program is simply getting cattle to eat desired levels of a balanced diet. Promoting relatively high levels of intake is generally a goal in dairy and feedlot enterprises, while maintaining the correct balance between self-fed feedstuffs may be the primary concern with beef cows, heifers, or calves on forage-based diets. Changes in supplement ingredients can factor into both scenarios, due to influences on palatability, stimulation of biologic signals, or the specific role of dietary salts.

Feeding a balanced diet to cattle – and doing it economically and consistently – is a growing challenge. But the potential costs of variation in feeds and diets is significant. A program to monitor and test potentially variable forages and commodities, and to purchase commercial feeds from reliable sources, can be a valuable investment.