

Straight to the Bottom Line 3/1/13

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Title- Rebar for the Rumen: A Discussion of Straw in Lactating Dairy Diets

In last month's column, we discussed the current emphasis on starch from corn and the major role it plays in dairy nutrition. This month, I want to address the ingredient that is on the other end of the spectrum, straw. The vast contrast between starch in corn and fiber in straw allows for the full description of the wide array of carbohydrates in a dairy ration. While starch from corn or other grains drives energy in the diet, straw supplies needed fiber. I often refer to it as "rebar for the rumen". When building diets, we can go too far with the desired response in milk production by adding more and more highly fermentable carbohydrates. However, in this quest for more and more energy, we must pause and remember what this great animal we feed was created to eat in nature. Ruminants were designed with the digestive tools to transform massive amounts of roughage into milk and meat. It is that truth that drives our formulations as it relates to roughage and fiber. Straw might be the best niche ingredient we have to honor this fact and easily add some extra structure to the rumen contents just like one might add rebar to concrete.

Just like there are recommendations that suggest how much energy, protein and various vitamins and minerals are required in a diet, there is also a requirement for roughage. Over the years, this requirement has taken on various names and units. But, the goal of all of these is to supply the correct amount of roughage in the diet to keep the rumen healthy and in fact ruminating. In order for the rumen to be considered healthy in a dairy cow, we must build and maintain a significant rumen mat or raft. This mat is a mass of tangled forage and feed particles that is buoyant in the fluid filled rumen and sits atop the rumen just below some head space of gas. It is from this forage mass that handfuls of forage are sent back up the esophagus to be re-chewed. This cud chewing process is important for the cow to adequately reduce the particle size of these forages and make them more available for the rumen microbes to ferment the carbs inside. Once these particles are small enough and no longer buoyant, they fall out of the rumen mat. Then, through a series of cyclical rumen contractions, they are swished out a small hole at the bottom of the rumen. This is the process called rumination.

We can gain some perspective by thinking about two animals at the opposite ends of the rumen spectrum to gain clarity on the balancing act we attempt when feeding the dairy cow in today's high production systems. First consider a beef cow grazing low quality CRP type forage while raising a calf. This cow's rumen will have a huge forage raft and her cud chewing will be early and often. She is working hard both with her jaw and rumen muscles to churn, grind and ferment enough carbs out of that low quality grass to raise a calf. When considering her worries in life including blizzards and coyotes, rumen health doesn't make the list. Now think about a steer in a feedlot hoping to make it to maybe two years of age before heading to the slaughter house. This animal has a short life span and a different list of worries. Depending on where he is being fed, maybe blizzards are on the list, but as we feed that animal, rumen health is his big concern. To maximize rate of and efficiencies of gain, this steer's diet has as little roughage in it as possible to keep his rumen from going over the edge. In this animal, there will be little or no rumen raft and cud chewing and ruminating is at a minimum. So, the beef cow has a 100% forage diet and this steer might be down around 5-10%. That describes the full spectrum of roughage levels and the dairy cow sits pretty much right in the middle.

As we feed the dairy cow, we have to grab some of the principles from both the grazing brood cow and the feedlot steer. We must have enough roughage in the rumen to build a smaller but still considerable forage mat like the brood cow and we also need digestible fiber to produce good levels of milk fat. But at the same time, while expecting a cow to peak well over 100 lbs of milk, we must include significant amount of soluble carbs like in the diet of the growing animal in the feed yard. I started this long discussion talking about straw. Now, make note that straw helps the dairy formulator have it both ways by feeding a small amount of a very concentrated and palatable form of roughage. This allows some of the roughage requirement to be met with less space required in the diet. The freed up space can then be used for more digestible ingredients to boost milk production. In next month's column, we will dig more deeply into using roughage levels in formulation to maximize both cow health and milk flow. Stay tuned...