Healthy, Productive Cows Need Healthy Rumens

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Do Your Cows Display Any or All of the Following Symptoms?

- Disappointing milk production. In particular, early lactation cows not peaking as high as expected.
- Decreased cud chewing or rumination. Cows should spend approximately 12 hours daily resting and the majority of this time they should be chewing their cud. When you walk through the barn, 50 to 60% of the cows not eating should be chewing their cud.
- Sore-footed or lame cows. Specifically, has your hoof trimmer or veterinarian said that your cows have laminitis or are foundered. These symptoms may occur weeks or months after the events causing the initial problem.
- "Hardship grooves" or ridges on hooves. Like our fingernails, a cow's hoof grows downward from the coronary band (where the skin/hair of the leg meets the hoof) at approximately 0.25 inch per month. With nutritional mismanagement or disease, a depression or disruption in the smoothness of the hoof wall occurs parallel to the coronary band. By measuring how far down the "hardship groove" has migrated, one can estimate when the incident occurred.
- Wide fluctuation in feed intake for individual cows. The average feed intake for the herd may remain relatively constant from day-to-day, but individual cows may have wide fluctuations in feed intake.
- Depressed milk fat percentage in more than 10% of the cows in the herd. Milk fat inversions occur when the butterfat is below milk protein test. For Holsteins, normally protein percentage is 81% of milk fat (example: at a milk protein of 3.0%, milk fat% should be 3.7% or higher). Jerseys normally have protein percentages that are 75% of milk fat percentage. Lower rumen pH is associated with depressed milk fat percentages. This relates to the incomplete biohydrogenation of fatty acids which inhibit milk fat synthesis. Bottom line for farmers to understand, rumen function impacts milk fat synthesis.
- Low body condition - Cows are thinner than diet formulation would suggest, which relates to feed intake.
- Digestive upsets- Feces in the herd or between cows in a pen vary from normal to very loose.

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The symptoms mentioned relate to a syndrome known as subclinical ruminal acidosis. Subclinical ruminal acidosis is characterized by periods where the rumen pH is lower than the optimum for fiber digestion (generally at 5.8 or less). Fiber digesting bacteria prefer a higher pH, usually around 6. The more time the rumen pH spends in the lower range, more negative effects can be seen. This syndrome results in a number of vague symptoms that often are hard to pin point. Cows are not extremely sick and do not usually die, but just do not eat and perform as well as expected. As always, we want to prevent problems rather than deal with disasters.

Management Factors Which Increase Risk for Acidosis

Five potential causes or contributing factors, which increase the risk for subclinical acidosis, are discussed in this article.

1. **Inadequate particle size of forages consumed by cows.** When cows chew their cud, they secrete saliva which buffers the rumen contents. In order to form this cud, cows must be fed forages with adequate particle size.

   Commonly seen: Dairy diets are designed, such that 10 to 15% of the diet is composed of forages that are at least 2 inches in length or the width of a cow's muzzle. These longer particles stimulate cud chewing and the resulting production of saliva helps buffer the rumen environment and optimize rumen pH. These longer particles also are important in forming the hay mat found on top of the rumen contents, which traps grain particles for longer periods of digestion in the rumen. On farm, we can see problems when silages are chopped too finely when ensiled or removed from the silo (silo unloader chews up the forage). In addition, forages may be adequate in particle size when loaded, but TMR mixers run too long which pulverizes forages, decreasing chewing or rumination times resulting in suboptimum saliva production. Often times, we see this problem when a farmer gets a new TMR wagon or replaces the augers or knives in an older mixer.

2. **Excessive sorting against longer forage particles.** This effect usually is seen when too much long hay and/or incomplete mixing of a TMR allows cows to sort against longer forage particles and selectively consume grain or finer particles in the diet. Cows use their muzzle to sort through a TMR, especially when the TMR contains a large percentage of longer particles or is possibly too dry allowing the grain particles to separate from the forages. Generally, the more aggressive eaters and those first at the feedbunk, select the more preferred concentrate particles resulting in an unbalanced diet for them, which is short on effective or chewable fiber. Cows coming behind the initial sorters receive a mix higher in fiber and lower in energy. These cows are generally the more timid cows, heifers and early lactation cows, possibly resulting in lower milk production or other health-related issues.

   Commonly seen: This problem has been observed in herds where 10 lbs of hay or more was included in the ration, especially when lower quality hay was incorporated. By watching the cows, you can observe the sorting behavior as cows use their muzzles to sort small particles from the larger sized. Also, if the total ration is too dry, sorting may be more pronounced at the feed bunk. With wet feeds, grain particles stick to the forage, thus potentially decreasing sorting.

3. **Inadequate feed bunk management:** Dairy cows do best when eating small meals throughout the day. By spreading feed intake and intake of grain in component-fed cows over the day, the rumen

environment is more stable which minimizes large swings in rumen pH, and thus helping to improve fiber digestion by the rumen bacteria and production and milk fat synthesis by the cow. The key to remember is that feeding management programs must allow the rumen microbes the best opportunity to grow and reproduce so they can provide the cow with the needed nutrients for milk production.

Commonly seen: Bottom line, dairy cows and, more importantly, rumen microbes like consistency. For the cow, this means consistent feeding times and availability, being fed close to resting areas, adequate feed and watering space to avoid the more dominant cows, comfortable resting areas, and an environment to avoid heat stress. The rumen microbes like a consistent, but steady supply of nutrients over the course of the day resulting in the rumen pH spending more time above a pH of 5.8. To accomplish this feat, avoiding slug feeding of not only grain but also the TMR is important. Cows need to consume small, "balanced" meals throughout the day. In TMR fed herds, feed needs to be available throughout the day, quality feed (not corn cobs or heated feed) left at the next feeding, and a consistent mix delivered to the cows from feeding to feeding. In component-fed herds, no more than 6 to 8 total pounds of grain should be fed within a 4 to 6 hour feeding window and long-stemmed hay fed approximately 1 hour before grain feeding, if possible. The more timid cows, usually heifers and early lactation cows, are most affected and are the cows generating the most profit or represent the future production of the herd.

4. **Transition from the dry cow lot back into the milking herd**- Dry and fresh cow feeding programs have seen major changes in diet formulation and how they are implemented on-farm over the years and changes will continue to be incorporated as we learn more. Far-off dry cows are fed a diet composed mainly of forage to meet, but not exceed, their energy needs while maintaining rumen fill and stimulating rumen muscle contractions necessary for mixing the rumen contents. With these higher forage diets, the rumen papillae that absorb the volatile fatty acids produced by the rumen bacteria, are shorter and less able to absorb the larger quantities of these acids produced on lactating cow diets. Currently, the recommended practice is to adjust dry cows to the forages fed to the milking herd three weeks before a cow or heifer calves with a slight step-up in energy density to begin the elongation of rumen papillae. These feeding practices help the cow start adjusting to the higher nutrient density of the ration fed to the milking herd before she calves.

   Commonly seen: This problem definitely is seen in dry cows fed hay and a small amount of grain prior to calving, no feeding transition prior to calving, and fed a high starch diets after calving. However, we also see issues with transition cows that are stressed by limited feed bunk and resting space as well as diet formulations that allow cows to be over conditioned at calving time or inappropriately designed mineral/vitamin programs increasing the incidence of fresh cow diseases or disorders, i.e. sub-clinical hypocalcemia or milk fever.

   Fresh cow diets should be designed to provide an adequate amount and particle-size of forages and appropriate amounts of carbohydrates to minimize drops in rumen pH below 5.8 and maintain rumen fill. In component fed herds or grain fed through a milking robot, grain should be increased over 7 to 14 day time frame (depending on amount fed) to minimize rumen upsets and insure adequate forage intake.

5. **Digestibility and starch content of corn silage**-During normal growing conditions resulting in normal ear development, corn silage consists of half grain and half forage. Studies have shown that few changes occur in fiber digestion after storage. Differences in fiber digestibility, however, do occur between crop years and are related to growing conditions or variety selection (i.e. varieties with the brown midrib trait are more digestible). In contrast, the digestibility of starch in corn silage and high moisture corn or earlage increases with length of storage. Thus, corn silage harvested this year and fed 1-month post-harvest is not equivalent to the starch-digesting bacteria to that fed after additional time in storage. Rations need to consider this since they are designed to feed the rumen bacteria or bugs first and these end-products, in turn, feed the cow.

   Commonly seen: During some growing years or in certain varieties of corn used for silage, the resulting fermented crop may contain more grain, thus more starch, and the fiber component may be more or less digestible compared to neighbors or previous years. Although we currently do not directly incorporate analyzed values for starch and fiber digestibility into ration balancing programs, these changes and deviations need to be taken into accounted. Also, brown midrib varieties of corn silage are lower in lignin and have a higher NDF digestibility than regular corn silage and generally less grain is included in these diets compared to conventional varieties with similar chemical composition.