by John Goeser

Waylay insurgents at feedout

EVEN PERFECTLY STORED FEED is still at risk of contamination. The storage bunker must be properly managed at feedout to maintain silage quality and limit contamination.

WHEN fermented forage or grain is opened up, exposed to air, and fed, the feed is put under attack by fungal and bacterial insurgents. Pathogenic microbe concentration will vary from near zero to overwhelming. The potential detrimental effects pathogenic pests leave behind, both on feed nutritive losses and dairy cow health, depend upon fermented feeds' defense mechanisms.

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This article isn't meant to be a comparison to that which our servicemen and women face defending our freedom but rather a description of microbial contamination potential that exists around and within every farm-grown feed. A feed's ability to fend off the microbial battle is defined by both feed cleanliness and aerobic stability.

Forage, grain, and TMR cleanliness and stability are more commonly discussed today than they were even 12 months ago. Veterinarians along with forage and nutrition consultants are working better together to understand the challenges (and opportunities) at hand. Yet, there are substantial areas we can continue learning and uncovering reasons cattle respond to forage in ways that often defy expectations.

Unexpected cattle responses often come from microbial contaminants within feed or compounds that fungal and bacterial contaminants produce (alcohols, biogenic amines, or toxins). These are not reflected in the typical feed nutritional analysis. Pathogenic bacteria or fungi can colonize in the digestive tract, harming dairy cattle.

Alcohols or biogenic amines may cause cattle to back off on intake. And toxins exert effects on the immune and reproductive systems, damage gut and tissue lining, and can disrupt rumen function. All of these deprive cattle of health and performance, robbing the dairy of profitability.

Keys to aerobic stability

Let's delve into contamination happening as the feed is fed out. High-quality feed from the field, properly stored in the silo, can fall apart if not managed properly through feeding.

The key to clean and healthy feed at feedout is keeping pathogenic microbial (bacteria and fungi) counts low and thus keeping the forage or grain stable. Harmful microbes are controlled, and feed stability maintained, by minimizing air (oxygen) access into the feed and keeping the feed pH low (less than 4.5) until its blended into the TMR.

Fermented feed, when properly stored, will be stable for dozens of years. When opened up, air exposure eventually leads to spoilage, through microbial degradation, if the feed is not consumed in a timely manner. The amount of time that it takes for feed to spoil, though, can vary.

Stability can last as little as a few hours, or in the case of cleaner feed with the proper defenses, it can stay stable (cool) for days. Aerobic stability (the number of hours before feed heats up and spoils) depends upon both feed defenses and feed management factors. University researchers actually use aerobic stability as a key measure of feed health and quality.

Poor aerobic stability begins with wild yeast kick starting a downward spiral of events that ultimately lead to contamination. Wild yeast come alive when exposed to air and then consume sugars and fermentation acids present to grow. These yeasts have been shown by Michigan State University and University of Delaware researchers to directly affect rumen metabolism and produce alcohol. Less sugar also means less feed energy and less acid leads to a greater feed pH. Then, when the forage or grain pH eventually crosses the 4.5 to 5.0 threshold, mold and pathogenic bacteria take hold.

Poor aerobic stability or extended air exposure may lead to *Clostridium spp., Listeria spp., Salmonella spp.,* and other pathogenic bacterial growth at feedout. We normally think of Clostridium bacteria in haylages. But these gut health disrupting bacteria can grow in corn and other silages following yeast growth or where pH has been compromised.

For example, when recently visiting a dairy, we found holes in a corn silage bag from rodents and identified these bacteria, which helped explain a gut health issue. Beyond bacteria, other gut health challenging fungi, such as *Aspergillus spp.*, can also grow during aerobic deterioration.

For improved aerobic stability and feed cleanliness, minimize the amount of forage openly exposed to air. Cut back enough plastic for up to two or three days' worth of feeding; do not cut back for a week or more. Scout for holes in surface plastic or bags on a daily basis and patch damaged plastic.

Check silage temperatures. The edges and core temperatures should not deviate by more than 10°F. If temperatures vary beyond that, microbial contamination is happening.

If visibly deteriorated feed is found when feeding, discard what you see and also an area 50 percent beyond what you see. The dark, spoiled feed is actually stable because the microbial battle has ended there. The microbial insurgents are then actively spoiling the feed around the spoilage, which still appears be healthy to the naked eye.

Beyond aerobic stability

Controlling offensive spoilage and contamination at feedout is partly tied to aerobic stability but also relies on controlling microbial counts from the field, building feed defenses during ensiling, and keeping feed clean at feedout. The number of negative microbes that can cause feedout challenges can be reduced through an aggressive up-front fermentation and low forage pH.

To further strengthen feedout defenses, consider a research-backed feed preservative (including benzoic, sorbic, propionic, or acetic acids) or a *Lactobacillus buchneri* bacterial inoculant. Both of these approaches have been shown to improve stability and reduce feed losses.

Avoid tracking mud and soil into the forage and TMR during feeding. Understand that fungi and bacteria are often soilborne and added dirt carries contamination. Slope feed pads to allow water to run off away from feed eliminating the opportunity for creation of dirty, bacteria-rich pools. Avoid storing feed on dirt if at all possible. Gravel, asphalt, and concrete are much better options to keep feed clean.

Benchmark your forage and feed cleanliness by quantifying mold, yeast, and enterobacterial counts or toxin load periodically. There should be less than 100,000 colony forming units per gram (CFU/g) of yeast or mold and less than 100 CFU/g of *Clostridium spp.* and other harmful bacteria per gram of forage.

In summary of this three-part series, understand that feed contamination can take place in three areas: at the field, in the silo, and at feedout. The impact on animal health and performance is real, and there is less room in today's dairy economy for dirty, contaminated feed.

Lessen the negative impact contaminants have on your dairy by building a more comprehensive forage management plan with your consulting team. Bring clean feed in from the field, store to avoid contamination, and ensure feed is properly defended from yeast and microbial growth at feedout for healthier and more productive dairy cows.

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