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A Diagnostic Approach to Moldy Feeds on Dairy Farms

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The 2009 growing season will make the year ahead a challenging one because of the high prevalence of mold in the corn and the potential for mycotoxin contamination of both corn grain and corn silage fed to dairy cattle. This situation brings with it an additional concern - how to deal with the improper use of feed yeast and mold counts in the field.

I do not recommend submitting corn or corn silage samples for yeast and mold counts (or identification). I do allow for one caveat, which is listed below. I have repeatedly observed that the diagnostic use of yeast and mold counts in the field usually does more harm than good. Here's why:

1. The results for the yeast and mold counts are primarily a function of how long (and at what temperature) the feed sample was stored before it was finally cultured at the laboratory. Yeasts grow rapidly, doubling about once every 2 hours or less. Unless samples are refrigerated immediately after collection and plated the same day, the yeast count results are almost always falsely elevated and therefore nearly useless. Molds grow more slowly and variably, but are also influenced greatly by sample handling after collection.

No respectable dairy herd manager would offer feed to dairy cattle that was taken from the face of a silo 24 or more hours ago. So why should we run yeast and mold counts on feed collected 24 or more hours ago and then make diagnostic decisions based on the results?

I do not suggest trying to pack feed samples on ice and submitting them to the lab quickly. This removes some of the error in this test, but leaves us with the fundamental problem that we don't know how to interpret the test results. Perhaps there is an upper level of tolerable yeasts and mold counts for the feed the cows actually eat. However, my impression is that by the time those levels are met the feed is almost certainly hot and smells bad. We don't need to spend money (perhaps besides purchasing a composting thermometer) to monitor these things. Also, we have to remember that yeast and mold counts are changing by the minute in the feed bunk. Trying to quantify them and their impact on cow health and performance is nearly impossible. To my knowledge researchers have not seriously attempted to do this. Researchers do use properly collected and handled yeast and mold counts to legitimately compare different methods of ensiling, additives, etc.

2. Quick test methodologies used by feeds labs for yeast and mold counts have suspect accuracy. Silage researchers and food industry laboratories use better but more expensive and time-consuming culture methods.

3. Counts (or presence) of yeasts or molds in feed ingredients is very poorly correlated with mycotoxin concentration.

4. For ensiled feeds, the yeasts or molds present at harvest are often not the same yeasts and molds that are likely to be present on the exposed silo face at feedout. Thus, yeast and mold counts taken before ensiling are of particularly low value.

5. There is little to no research on the effect of yeast and mold counts on animal performance (even less than on the effects of mycotoxins). The tables of values published by various feeds labs representing "acceptable" and "dangerous" yeast and mold counts are not based on any scientific evidence as far as I can tell. I am always open to good data that support the claims made in these tables. But in their absence, I find it disturbing that these criteria have crept into the dairy industry and found credibility there.

But the way many consultants are using yeast and mold counts in the field is of essentially no value. Harm then follows when yeast and mold counts become a scapegoat for poor health and performance that diverts attention away from the real on-farm issues.

The only good argument I've heard for doing feed ingredient cultures is to identify *Penicillium roqueforti*. This mold grows during the feedout phase - in the presence of oxygen. It can grow even at low pH. It can produce mycotoxins that aren't part of routine mycotoxin screens. Unfortunately, we still don't know much about this mold (i.e., threshold counts, effects of specific toxins it might produce, etc.).

Perhaps at the heart of the issues related to yeast and mold counts is the question of whether the problem with "bad feeds" is the microbial contamination of the feed itself or whether the problem is the bad things that some microbes produce some of the time (heat, noxious smells, butyric acid, amines, phytoestrogens, mycotoxins, etc.). There has been a substantial shift toward the "microbes are the problem" theory (probably because the lab test is relatively cheap and easy) without any substantive evidence. If that evidence is produced at some time in the future, we can rethink the value of these tests. But for now, in light of the inaccuracies associated with yeast and mold counts, I think we are in nearly all cases much better off monitoring the bad things that the microbes sometimes produce rather than the microbes themselves.

No one would choose to feed moldy corn or corn silage to dairy cattle. But at least we can rationally approach the challenges presented by this year's corn. My advice (from a Midwestern perspective, where we almost never encounter aflatoxins) is to:

1. Start with visual appraisal for mold.
2. Watch for feed refusal when new/moldy feed ingredients are introduced. Feed refusal is the most reliable sign of a clinically significant mold problem in a feed ingredient. The challenge is that it can be difficult to appreciate refusal of an ingredient within a TMR. You have to watch intakes carefully as that ingredient goes into or out of the mix.
3. Conduct mycotoxin testing when warranted (I realized that the definition of warranted varies widely among consultants). If you do decide to test, start by sampling the TMR. Sample individual feeds if the TMR is too high. What constitutes "too high" of a mycotoxin concentration is a matter of great debate - a discussion I'll avoid here.
4. Practice excellent feed storage and feedout management. This can make or break the dairy when the feeds may already be contaminated going into storage.
5. Consider using "mycotoxin binders" - but recognize that none are FDA approved for this purpose. Don't expect miracles from them.
6. Dilute out high mycotoxin / visibly moldy feed ingredients when possible.

We could have legitimate health problems in some dairy herds from this year's moldy corn. But ruminant animals have the ability to detoxify substantial amounts of mycotoxins. I don't think this is going to be as big a problem as some will make it out to be - especially if their diagnosis of the problem is based solely on bogus yeast or mold counts.