Mycotoxins: Silage Quality and Management

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Every few years we tend to have what could be called a “nonstandard” growing season. And this year has certainly been that. The wet, cool spring has disrupted the usual timetables of planting and harvesting for many producers. Now, the recent heat and lack of moisture may be leading to other problems. Haylage harvested either too mature due to late harvest or immature because of the cool weather will probably lead to a great deal of variability in haycrop forage quality. Plus potential drought conditions for some parts of the state may affect corn growth. Regular evaluation and laboratory testing of forages this winter will be needed to help keep rations balanced and milk production on track. But that is not what this article is about. Another issue may well be raised this winter for many producers that relates to this year’s growing season, forage production and foage feeding management. Mycotoxin contamination could be more of a possibility for some forages this year.

Most grains and forages harbor some mold contamination. Though in most cases, mold growth is not sufficient to produce enough mycotoxin to effect animal health. In the Midwest, the most commonly found mycotoxin found in silages is deoxynivalenol or vomitoxin. Fortunately, researchers report that vomitoxins do not appear to affect milk production, milk quality, feed intake or animal health. But vomitoxins do appear to be a good indicator of the presence of other types of mycotoxins. One of these, zearalenone, has an estrogenic effect that can disrupt reproductive function. Zeralenone is commonly found in vomitoxin contaminated corn. Plus there are variety of other somewhat less common toxin producing molds appearing in the crops which we convert to silages. These produce substances such as aflatoxin, ochratoxin and the toxins T-2 and DAS, which do have the potential to negatively affect animal health and production severely. As the level of mold contamination increases, the likelihood of animal health implication increases as well. But, it is not likely that even this odd year there will be very many cases of forages having toxic levels of mold contamination at harvest time. A low level or marginal level of mold contamination, which would normally not be a problem, could spread in storage and become a problem.

Molds need very specific conditions of moisture and oxygen to grow and when they do not have these they become dormant. If the dormant mold spores are introduced into a situation favorable for growth the mold will again begin to grow. Our goal is to not allow those conditions to occur. Molds require a moisture level of about 13% (Silages certainly meet this requirement) and a minimum of 1 to 2% oxygen. So the exclusion of Oxygen from the silage becomes the key. Allow oxygen to enter the mass of silage or fail to exclude it sufficiently during packing and mold growth will continue, potentially increasing the mycotoxin content in the silage.

There are in general two time periods when the potential for Oxygen infiltration is greatest. During filling and during feeding. The exclusion of Oxygen is one of the primary goals of the packing and filing process in a horizontal silo. The fermentation process is mostly anaerobic in nature and the presence of oxygen slows the process. So forages that are poorly packed will contain more Oxygen and potentially allow any mold present to grow and multiply, increasing the level of Toxins in the silage. To ensure the best conditions for the ensiling process to proceed and limit the potential for mold growth after sealing the silo attention must be paid to packing and sealing. In a horizontal silo it is desirable to reach a dry matter density in the bunker of 14 pounds per cubic feet. To determine silage density in your own silo consult

the Wisconsin Forage Team Website (http://www.uwex.edu/ces/crops/uwforage/uwforage.htm Look under corn silage). If you suspect silage density is low, consider adding more weight to the packing tractor or adding more tractors to the job of packing. Spreading the forage in layers of less than 12 inches thick will also aid in compaction, but may slow the packing process. Research from Wisconsin indicates that producers who use custom harvesting for corn silage may have more difficulty meeting the 14 pounds per cubic foot minimums for density due to the speed that the bunkers are filled. Following packing, the bunker silo should be covered and sealed. The current preferable material for this is polyethylene sheeting. Ideally the plastic should be held closely in place with tires or tire halves. The current recommendation for a good seal is for approximately 15 tires per 100 square feet. Some might consider the money and energy spent on covering and uncovering the silo as well as the disposal of the plastic to be an unreasonable difficulty. Unfortunately, the addition of plastic will return as much as $8 for each $1 spent on covering just in the amount of feed saved. For more on covering the silo please see the MSU dairy Team website in the dairy management section under forages (http://www.canr.msu.edu/msue_thumb/pages/dairy_team/dairy_team.htm).

The other time period where bunker silos are susceptible to mold growth is during feed out. When removing silage from the bunker avoid creating cracks that will allow Oxygen to reach into the inner part of the bunker not yet exposed to air. A scrapping action down the face of the bunker or across the face is more desirable than “digging” straight into the silage. This is because leveraging out a bucket full of silage from the pile, while faster, will cause cracks to open leading into the depths of the silo which allows Oxygen into area that will not be fed for several days. Oxygen allows the mold and other microorganisms to come back to life, begin heating the feed, degrade silage quality and increase mold growth. One solution to removing feed from the silo that is becoming more popular is to use a “Scarifier”. The scarifier loosens silage from the face of the bunk with its rotary action and drops it to the ground. It does not disturb the remaining silo face, minimizes Oxygen infiltration and thus helps maintain feed quality. The width of the silo face should be such that the entire face is moved back to fresh feed each day. In this way, air exposed feed will have the smallest opportunity to begin heating. Every effort should be made to ensure that feed quality for high producing dairy cattle is the best quality it can be.

Even though the year 2002 might be a year of unusually weather effected crops, mold growth and mycotoxin levels in feed are always a concern. A poorly packed and or managed silo could provide a source of problems for dairy producers any year. But in this year it could be something that will be more widespread than usual. It is in the producer’s interest to consider these issues when developing forages for feed this year.