Managing flood damaged corn for silage

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Too much of a good thing may not be that good after all. The recent rain events in many parts of the state have left many producers facing a less than ideal situation: corn for silage in flooded fields. This situation presents a series of challenges and some hard decisions have to be made on a case by case basis by each farm, including:

- Pre harvest decisions:
  - Is this material worth harvesting? Is this something to claim on crop insurance?
  - Is there a possibility of trading off quantity for quality? Harvesting less forage to salvage the portions of the plants that are not damaged; set the harvester head above the silt line.
  - Quality of silage will likely be lower, are you willing to spend extra money to use products to partially compensate for poor fermentation?
- Post-harvest decisions:
  - Molds are perhaps the greatest risk. Lab tests for mycotoxins are a must for flood damaged crops. Are you willing to spend money on lab tests?
  - Feed additives may be needed to reduce the absorption of mycotoxins, this will represent an extra cost for a feed of compromised quality.

It is important to point out that the quality of corn from flooded fields will more than likely be compromised and that there are no solutions that are 100% effective to fix the many problems that come with this type of silage. The only thing left to do is to adapt and prepare to use tools or technology that may alleviate some of the issues associated with flood damaged corn silage.

What happens to flood damaged corn for silage and how can this affect the cows?

The table below summarizes the most common effects of flood damage on forage quality and also the effects on cows' performance.

Issue	Origin	Effects on forage quality	Effect on cow performance	Prevention or solution
High load of clostridial bacteria	Soil contamination	Poor fermentation, butyric acid may be present. Bad smell and poor nutrient content.	Depressed feed intake. Ketosis may develop or exacerbate upon feeding high butyric acid.	Harvest as close as possible to 35-38% dry matter. Use silage inoculants to speed up fermentation and halt the growth of clostridial bacteria.
Molds growth	Naturally present molds that thrive in hot and humid conditions	Lower forage and grain quality.	Varies depending on severity of mold growth. Depressed feed intake, low milk production.	Utilization of mold inhibitors such as buffered propionic acid or other products that enhance bunk shelf life also known as aerobic stability.
Mycotoxins	Molds	Lower nutrient content, reservoir for mycotoxin accumulation	Varies depending on type of mycotoxin. Depressed feed intake, low milk production, abortions, ovarian cysts.	Some additives may reduce mycotoxin absorption but the type of additive depends on the type of mycotoxin. For example, calcium montmorillonite clay has high affinity for aflatoxin and reduces absorption.

Dealing with clostridial fermentation

The natural fermentation of corn silage is driven by lactic acid. The plant material in a silage pile becomes acidic when this acid accumulates and the conditions are such that no microorganism live after the pH drops to around 4.0. This is a process that takes some time and there may other microbes trying to survive in this environment. When corn for silage has soils contamination it is likely that clostridial bacteria will be present in large amounts in the forage. These bacteria carry out an alternate fermentation pathway that produces butyric acid. This acid is very off-putting and cows have a hard time accepting this forage; in addition, it can trigger or exacerbate ketosis in fresh cows.

The best practice is to prevent clostridial growth. In order to so, it is necessary for the silage to become acidic quick enough so that clostridial growth is minimized. One way to accelerate the fermentation processes is using silage inoculants that contain bacteria that exclusive produce lactic acid. Since the quality of flood damaged corn silage is already compromised it is very important to do the best to salvage the forage that can be harvested, therefor it is recommended to invest into a product from a reputable company with scientific support for their products and claims. DO NOT use chlorinated water to dissolve the inoculant, doing so can kill a lot of the bacteria needed for the fermentation process.

If there are suspicions that corn silage underwent clostridial fermentation, for example a rotten smell, it is necessary to submit a sample to a forage laboratory to have it tested for fermentation profile including volatile fatty acids (VFA). If the profile reveals presence of butyric acid it will be necessary to take additional measures to manage this forage for lactating cows. Avoid feeding this type of silage to pre and post fresh cows because of the off putting smell and increased risk for acidosis. Limit butyric acid intake for the lactating cows past the fresh period, using other forages to dilute the concentration of butyric acid is the most common was to deal with this problem. Work with your nutritionist to formulate a ration that delivers less than 50 grams of butyric acid per cow/day. Some reduction in the butyric acid content is possible if the silage airs out overnight because butyric acid is a volatile compound.

Dealing with molds and mycotoxins

Heat and humidity are a good combination for the proliferation of molds on standing crops. These molds produce secondary compounds known as mycotoxins, and as the name implies these compounds are toxic and can have devastating effects on animal health and also on human health by direct exposure of by consumption of products contaminated with mycotoxins. As with many aspects of animal production, investing in prevention is far better than spending in correction. Flood damaged corn is highly susceptible to have mold and mycotoxins and the problem can worsens during storage. Mold and yeast inhibitors can be added at the time of harvest to limit the growth of mold thus reducing production of mycotoxins. Buffered propionic acid is one of the most widely utilized mold inhibitors and application of this product is similar to bacterial silage inoculants, DO NOT combine mold inhibitor and inoculant in the same tank.

Laboratory tests are needed to confirm the presence of mycotoxins. Depending on the type of mycotoxin detected in the feed, it would be necessary to use certain products that can help reduce absorption of mycotoxins by the animals; most of these products are clay based. Research published in 2016 showed that feeding calcium montmorillonite clay at 1% of estimated dry matter intake reduces the transfer of aflatoxin from feed to milk by more than 50%; other clays have been tested for various types of mycotoxins, work with your nutritionist to find a suitable product for the type of mycotoxins present in each particular farm.

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