Feeding silages containing butyric acid

Steve Massie for *Progressive Dairyman*

This and last year's cool, wet springs added to the challenge of making high-quality forage. With higher moistures than desired, low sugar content and higher ash levels sometimes resulted in poor fermentation and the production of butyric acid. Butyric acid is a strong acid that overrides the production of the preferred lactic acid, which gives good fermented silage that well-preserved smell. Butyric acid silage has a sharp, pungent odor that stays on your hands well after you have dropped the silage in disgust. This bright-green silage can be easily seen in the silage storage unit, and the color contrasts well against the well-fermented silage. Butyric acid levels can be confirmed in a forage lab analysis by requesting a volatile fatty acid (VFA) test. Since butyric acid levels are often not uniformly found throughout the silage, but are typically found in layers, it is best to run the amount of silage fed in a day through the TMR mixer and then test this mixed silage to get more accurate results.

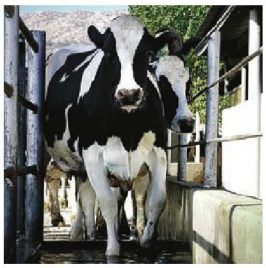
Butyric acid is reported as a percent of dry matter (DM) on lab reports. A sample with any level of butyric acid shows poor fermentation and can cause poor animal performance. The general rule of thumb is to try to keep the total amount of butyric acid fed below 50 grams per day per head on lactating dairy cows. This can be calculated by taking the reported percentage, dividing by 100 and multiplying by the pounds of dry matter fed of this silage and multiplying that by 454 (since there are 454 grams per pound) to get the grams of butyric acid fed. So a silage tested with a butyric acid level of 1.60 percent of DM /100 x 6 pounds of dry matter fed x 454g/lb = 43.6 grams of butyric acid fed per head per day.

Feeding more than 50 grams of butyric acid can reduce feed intakes, resulting in lower milk production and poorer feed efficiency. It has been reported that long-term feeding can reduce butterfat, slow weight gains and has been associated with increased laminitis in lactating dairy cows.

The rule of thumb for butyric acid intake in dry cows is even lower and many nutritionists feel 20 grams is the maximum. Butyric acid will chemically convert into beta-hydroxybutyric acid (BHBA), which will increase the chances of a dry cow coming down with ketosis once she freshens. Because of this increased risk, smart producers try to avoid any butyric acid-containing silage going into dry cow rations altogether.

When a dairy producer has harvested a high butyric acid-content silage, they typically want to feed it. Dilution is the solution. Back-calculating the butyric amount can give you an indication on the maximum amount of dry matter of the silage you can feed. Again, because the butyric acid is usually not uniformly distributed throughout the silage, I discount this maximum amount of dry matter calculated by 10 percent just as a safety margin. The good news is butyric acid is a strong acid and the silage will have a low pH, so oxygen exposure typically will not allow the silage to spoil or to heat, especially if a limited amount of the face is fed. In fact, many dairy producers will knock down the next day's feeding and allow the butyric silage to air out overnight to reduce the VFA content. I have tested this several times and it usually is about a 50 percent reduction in butyric acid when aired out overnight. Remember, butyric acid is a volatile fatty acid and will escape into the atmosphere over time.

The best solution is to avoid the butyric fermentation to start with. Knowing the factors that start a bad butyric fermentation can help a producer avoid the issue. Butyric fermentations like wetter forages. Waiting to harvest when the plant material is below 60 percent moisture will increase the odds of a good lactic acid fermentation. Faster drydown times can be achieved by wide-swathing forages at mowing and leaving higher stubble to allow air to move under the swath and keeping it off the damp ground. Tedding the



swath apart also speeds up drying time immensely.

Higher sugar content in forage will jump-start the fermentation process towards the desirable lactic acid fermentation. Sunshine increases the sugar content of the plant before and after mowing. Mowing forages on cloudy days or mowing following several days of clouds will decrease the sugar content of the plant. Mowing into deep, narrow windrows also decreases the sugar content as the plants buried deep within the windrow continue to respire, burning sugar as energy. Wide-swathing windrows allows more surface area to absorb sunshine which will allow the plant cells to continue with photosynthesis, which increases the sugar content. Plus, this whole process uses water, helping to dry the plant and getting to the desirable moisture faster.

Ash in silages acts like a buffer to the fermentation process; the higher the ash, the more buffering that can occur. A buffered fermentation slows the pH drop, allowing the butyric acid-producing bacteria to overwhelm the lactic acid bugs and can result in high butyric acid silage. Producers wishing to avoid butyric fermentations will do everything in their power to minimize adding ash to the silage. Leaving higher stubble, having rakes set at the right height (top of your boot) and avoiding angled mower blades that act like propellers pulling ash off the ground and into the silage can all reduce the amount of ash added to your silages. Those on sandy soils need to be even more diligent in their harvest practices to avoid adding ash. Forage labs test routinely for ash and typically silage will contain about 8 to 10 percent ash. Anything above these levels increases the odds of having a butyric fermentation. So an ash content of 15 percent means you have added at least 5 percent ash to your silage. That is 100 pounds of ash per ton you just added to your silage – and you wonder why you had a bad fermentation.

Forage that is down and gets rained on will also have increased ash content. With exposed soils from cutting and forage laying just inches away, it is easy to imagine soil getting splashed up and onto the downed forage, thus increasing the ash content. Extended wilting time also lowers sugar content even further, adding more challenges.

Adding a good homolactic bacteria inoculant to your silage will also help in preventing butyric acid fermentation by increasing the numbers of naturally occurring bacteria that produce lactic acid, helping to drive the fermentation in the correct direction. There are several reputable companies that sell both liquid and dry products with homolactic bacteria. You can also add acid to wet forages that quickly lower the pH to help ensure the lactic acid producers outgrow their bad competitors. Many top forage producers will increase the application rate of these products when they know the forage is wetter than desired, fearing reduced sugar content or higher ash content. Keep in mind that a couple pounds of bacteria or acid will struggle to outperform 100 pounds of added ash.

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Knowing what can cause a butyric fermentation can help producers avoid the bad fermentation product. Good moistures, high sugar content, low ash and a good inoculant will all decrease the chances of having a butyric fermentation. But if it does occur, dairy producers can manage the less-than-desirable silage. Test the silage to get a VFA profile to know how much butyric acid you are dealing with. Never feed more dry matter to exceed 50 grams of butyric acid per head per day to lactating cows and 20 grams per head per day to dry cows to avoid major issues. **PD**

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