Should I use a Silage Inoculate?

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Each year producers ask if they should use silage inoculate when harvesting silage, haylage, or baleage. Silage inoculates are bacteria which anaerobically ferment plant sugars and starches in forage primarily to lactic acid which decreases the pH of the forage to preserve it until it is fed. There are two basic types of silage inoculates: homofermenters and heterofermenters. The homofermenters are primarily lactic acid producing bacteria and are good for forages harvested at lower DM contents that contain low concentrations of fermentable carbohydrates and have a higher natural buffering capacity. Heterofermenters are a mix of bacteria including the lactic acid producing bacteria along with Lactobacillus buchneri, a bacteria that produces more acetic acid, which is good for inhibiting yeast and molds, especially once the silo has been opened. The heterofermenters have become more popular in recent years as they seem to be more effective for some of the more challenging crops. You should inoculate based on the crop you will harvest and the recommendations of the company based on their research.

Often times producers will comment that they do not see the benefits of using a silage inoculate. There are similar bacteria that will facilitate normal fermentation naturally present on the forage at harvest. Unfortunately we do not know if they are there in adequate quantities to support normal fermentation until it is too late and we are dealing with poorly fermented silage. The other issue is the concentration of yeast and mold that are naturally present and result in nutrient losses that are not detectable to the eye. Thus the first role of a silage inoculate is to insure that adequate quantities of the proper bacteria are present to facilitate a quick fermentation that drops the pH and produces the desirable blend of acids. If forage is harvested and ensiled without adequate bacteria to facilitate a quick fermentation, additional carbohydrates are burnt up through plant cell respiration or by yeast, which turn them into heat. In this situation, proteins are degraded to ammonia, amines, and other products that reduce the usefulness by the animal. This is especially true in grass and legume forages.

The second role of a silage inoculate is to prevent secondary fermentation once the silo is opened. When oxygen (air) is introduced into the silage, the yeast wake up and start fermenting soluble carbohydrates and producing heat. This is compounded when less than 12 inches of silage is removed from the silo face each day, especially during warm weather. Secondary fermentation is easy to detect by measuring the temperature of the silage in the face of the silo or

the loose silage on the floor. In many cases, the heat is easy to detect by feeling the silage. When silage is mixed with other ingredients in a TMR, the heat produced from secondary fermentation increases because we added additional fuel for the yeast to consume resulting in hot feed in the bunk that the cows do not want to eat.

Of the forage crops, corn is the most forgiving because of the high concentrations of starch and sugar when it is cut before the grain reaches black line maturity. However, there is no guarantee that the correct population of bacteria will be present. Also, many producers use lagoon water to irrigate their forages, which changes the normal bacterial populations that are not as effective for promoting normal fermentation. Grass and legume forages typically have much lower concentrations of sugar and higher natural buffering capacities which make them more difficult to ferment properly.

There are many different silage inoculates available on the market. Producers should ask for research information that documents how the product they are considering works on the crop they will use it on. Silage inoculates are typically live bacteria, so they need to be stored in a cool area out of the sun until time to use them. Silage inoculates cannot overcome poor management practices, so harvest forage at the proper stage of maturity quickly, pack tightly, and cover as soon as possible to reduce exposure to oxygen. Never use chlorinated water when mixing the inoculate as chlorine will kill many of the bacteria and the product will not work as designed. The inoculate tank should be placed where heat from the engine will not warm (cook) the bacteria rendering them ineffective. Most inoculates were not designed to overcome forage harvested too wet (<30% DM) or too dry (>55% DM). If this situation occurs, consult the company to get their recommendations.

Producers question the economics of using silage inoculates as they are expensive and cost ranges from $0.75 to $1.25 per ton. Under normal conditions, proven silage inoculates consistently reduce pH and improve aerobic stability after opening the silo. Improvements in DM recovery related to reduced carbon dioxide and methane production and improved microbial protein production are realized in 38% of trials. Improvements in animal performance of 3-5% were observed in approximately 50% of the trials. There are greater improvements for grass and legume silage compared with corn silage.

I would recommend producers consider silage inoculates as a risk management took to minimize the risk of poorly fermented silage and reduces secondary fermentation. As silos have gotten bigger, use of silage inoculated to minimize shrinkage during initial fermentation and after opening the silo is even more important than before. There are several companies who have quality products, but be sure to ask about their research.

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