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Help in Choosing an Effective Silage Inoculant ~ Planning Ahead

It is never too early to start planning for the harvest. Ensuring the quality of silage and haylage is critical to any good feeding program and maintaining a balance of nutrients.

Microbial inoculants can improve the process of silage fermentation by preserving more nutrients and dry matter, which can lead to improved livestock performance. Some inoculants have also been designed to specifically improve aerobic stability. This is important because a large portion of dry matter that is lost in the silo, bunk or bag is actually due to aerobic spoilage. There are so many silage inoculants and claims that it is no wonder producers become confused about which one is the best... or which one will perform. Here are a few tips to help make an informed choice this year.

An effective silage inoculant will have independent, statistically analyzed and published data supporting its use. Of course, the more of this that is available to consumers the more credibility the product has. Taking an educated guess ~ you could safely say that no more than 10 to 15% of the available silage inoculants on the market have more than five publications showing they really work. Caution needs to be used when you see a company brochure showing "university data", which has been taken from university studies that have not been published. Many individuals place more weight on research that has been independently published, was statistically analyzed and is in a citable form that can be found in an indexed search of available literature ~ such as peer-reviewed articles found in such publications like Journal of Dairy Science, Journal of Animal Science, Animal Feed Science and Technology, etc. When reviewing literature about a product, check to see if there are some studies where the product did not work. No product works all the time, but the better products work a high proportion of the time. Companies with high integrity will share both the positive and negative results with you.

You may hear the argument that because a company sells an inoculant that has bacteria with the "same name" used in other studies, that those studies support its use. Many bugs have been given the same (or similar) name, but not necessarily the same activity or properties. Thus, this is not a valid argument.

The most common types of bugs that are in our silage inoculants include homolactic acid bacteria, heterolactic bacteria, and sometimes propioni bacteria. Homolactic acid bacteria (e.g. *Lactobacillus plantarum*, *Enterococcus faecium* and several species of *Pediococci*) improve the initial fermentation process by speeding up the production of lactic acid. A quick drop in pH can reduce protein degradation and prevent the growth of several undesirable microbes in silage (e.g. *Enterobacteria* and *Clostridia*). This can lead to improvements in the recovery of dry matter and sometimes improvements in animal production because of more efficient

fermentations. However, homolactic acid bacteria are not very effective in improving the aerobic stability or shelf life of silage. On a dairy farm, a large portion of dry matter loss in a silo is actually due to poor shelf life (not just fermentation losses). Of the heterolactic acid bacteria, only *Lactobacillus buchneri* is acceptable as a silage inoculant. *Lactobacillus buchneri* by itself has minimal effects on the initial fermentation process, but during storage it converts moderate amounts of lactic acid to moderate amounts of acetic acid, which is a potent inhibitor of yeasts and molds. As an added benefit, sometimes there is production of propionic acid ~ another good inhibitor of yeasts and molds, in silage treated with *Lactobacillus buchneri* (but this is not a direct end result product from this bacteria).

Many silage inoculants contain multiple types of bacteria. In some studies, combinations of organisms have led to improved efficacy. But all combination products are necessarily better than an inoculant with only one organism. Recently, homolactic acid bacteria have been combined with the heterolactic organism *Lactobacillus*, to provide stimulation of early fermentation and prolonged shelf life during storage and feedout.

In order for silage inoculants to be effective they must be added at a high enough rate to compete against detrimental organisms and dominate the ensiling process. For homolactic acid bacteria, the industry standard is a final application rate of 100,000 colony forming units (cfu)/gram of fresh forage. The probability of a silage inoculant being effective is markedly reduced if it supplies less than this number of homolactic acid bacteria. In some formulations containing *Lactobacillus buchneri*, the final application rates are several times higher (400,000 cfu/g for silages and 100,000 cfu/g for high moisture corn), which further increases its probability of success in the field. Accurate calibration of equipment and distribution of the inoculant onto the silage are essential to using a good silage inoculant. Never add less than the recommended rate to save a few cents. By doing this, you have decreased the probability of the product working.

A low or premium price alone should not be the driving factor when choosing an inoculant (remember – research, research, research!). Consider what is available and get all the facts before making a decision. In the end, a quality silage inoculant can be an investment in the feeding program throughout fall and winter months. It can make a difference!

(edited from an article by Limin Kung, Jr., Dairy Nutritionist, U. of Delaware)

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