

Investigating inoculants

Key points to consider when treating silage

By Linda L. Leake



PHOTO: RICK MOONEY

If you have a hard time evaluating silage inoculants, you are not alone. Charlie Stamey has used a number of different inoculants over the past 15 years. “Some work better than others, and it’s difficult to pinpoint which one works best,” says the Statesville, N.C., dairy producer.

It’s no wonder: The labeling of inoculants is highly variable and makes comparing products difficult, says Richard Muck, an agricultural engineer with the U.S. Dairy Forage Research Center.

“What’s critical is the number of homolactic acid bacteria applied per unit of crop,” Muck says. “Buy a product that applies at least 90 billion live lactic acid bacteria per ton crop as fed or 100,000 per gram crop. For the inoculants that are labeled with the number of bacteria in the bag or bottle, it’s necessary to calculate how many will be applied to the crop. Higher numbers than recommended minimum rates are not always better,” he adds.

Inoculants may contain one or more strains of homolactic acid bacteria, the most common being *Lactobacillus plantarum*, *L. acidophilus*, *Pediococcus cerevisiae*, *P. acidilactici* and *Ente-*

rococcus faecium. These organisms are designed to improve the rate of fermentation during early ensiling. “Be skeptical of products that contain other species,” Muck advises.

Research has also demonstrated that several inoculants have improved fiber digestibility. However, the improvements in digestibility have not always led to improvements in intake.

A recent survey of inoculant studies in all silage crops found that intake was improved in only 28% of the animal studies, whereas gain and milk production were improved half the time, says Muck.

A newly approved heterolactic acid bacteria, *L. buchneri*, is currently creating a favorable impression on scientists. Unlike homolactic acid bacteria, *L. buchneri* has the unique ability to produce acetic acid from lactic acid under anaerobic conditions. The end result is improved aerobic stability of silages because acetic acid reduces yeast and mold growth, according to Limin Kung, a dairy scientist with the University of Delaware.

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“The bottom line is that silages inoculated with *L. buchneri* are more resistant to heating up during storage and at feed out [when exposed to air] as compared to untreated silages,” Kung says.

It’s important to consider performance differences between specific strains of an organism, Muck says. “Some *L. plantarum* strains may grow better on alfalfa, others better on corn. Some strains may grow better under drier conditions or higher temperatures than others. Use a product labeled for the crop you are ensiling.”

Both liquid and dry products can be effective, but liquid application has some advantage, Muck believes.

“First, lactic acid bacteria grow where they are placed and cannot move around,” he says. “That means inoculants must be applied as uniformly as possible to maximize effectiveness. A liquid sprayed on the crop at the chopper provides the best opportunity.”

Second, the bacteria in the liquid product should begin working faster than a dry product, because dry bacteria need to be moistened by plant juices before they can begin to grow. Third, most inoculants need to be kept cool and dry prior to use. “This is easiest with the liquid products that come in small packages that can be placed in a refrigerator,” Muck says.

But there are two dilution concerns with liquid inoculants. “If your water is chlorinated, use a swimming pool test kit to check the chlorine concentration,” says Muck. “If it’s greater than 1 part per million, allow dilution water to sit open to the air overnight to reduce the chlorine level, or look for an inoculant that can handle higher chlorine levels.”

Also, once a product has been diluted, it generally needs to be used within 24 hours.

What about cost? A typical inoculant containing homolactic acid bacteria may cost about \$1 per treated ton of crop, Muck says, but it might vary from 40¢ to more than \$2 per ton.

Inoculants containing *L. buchneri* will be on the high end, Kung adds. “They are worth the expense because they are doing things more like what several pounds of buffered propionic acid would do for silage, most notably improving aerobic stability,” he adds.

For more information on inoculants, check out www.uwex.edu/ces/crops/teamforage/index.html. **DT**