



SILAGE INOCULANTS –

A tool for improving aerobic stability in silages

For many years manufacturers of the use of various silage inoculant products have improved aerobic stability in silages. Typically, aerobic stability is typically defined as the ability to resist heating in the presence of oxygen. There is an assumed benefit in terms of animal intake, loss of energy due to heating etc. although no inoculants claiming to improve aerobic stability have shown any associated improvement in production or efficiency with improved aerobic stability.

The most comprehensive review of silage inoculant trial and their impact on aerobic stability was done by Muck and Kung. Their review of all published trials found in 1/3 of the trials the inoculants improved aerobic stability, aerobic stability was negatively impacted in 1/3 and in 1/3 of the trials there was no effect. The interpretation of this can be complicated. When a lactic acid producing bacteria is most effective, production of volatile fatty acids known to inhibit yeasts and molds are reduced or eliminated. As a result, the inoculants most effective in producing fermentations that result in 100% lactic acid being produced tend to actually worsen or reduce aerobic stability. Conversely, inoculants which were less effective in resulting in the desired homo-lactic fermentation profiles would produce silages with increased aerobic stability.

The most proven and effective silage inoculants in regards to improving the aerobic stability of silages rely on the use of a novel bacteria, *Lactobacillus buchneri* at 400,000 cfu's per gram of silage. *Lactobacillus buchneri* is a heterofermenter and produces a significant amount of acetic acid which is a known effective inhibitor of yeast. Yeast growth is associated with a lack of aerobic stability since lactic acid consuming yeast is associated with the lack of stability. The yeast consume the lactic acid and as a result the pH rises and allows the growth of molds and detrimental bacteria in the presence of oxygen.

One other effective means of obtaining improved aerobic stability in silages is from the use of lactic acid producing bacteria such as some *Pediococcus pentosaceus* which ferment 6 carbon sugars to lactic acid yet also are able to ferment 5 carbon sugars to lactic and acetic acids. The use of these bacteria, especially in combination with hemi-cellulase enzymes (xylanase specifically) are able to improve aerobic stability significantly.

CONCLUSION – using homo-lactic bacteria inoculants are as likely to worsen aerobic stability as to improve it. *Lactobacillus buchneri* at 400,000 cfu's per gram is an effective method to improve aerobic stability while the use of alternative bacteria such as *Pediococcus pentosaceus* plus enzymes may be helpful.