



ENZYMES AS A SILAGE ADDITIVE

Enzymes are commonly used either as an ingredient in silage inoculants or occasionally used alone as a silage additive. Enzymes are naturally occurring compounds which promote the breakdown of various components in forage (starch, cellulose, hemi-cellulose, protein etc.). The enzymes that are commonly used in silage additives are cellulase, hemi-cellulases and amylases. Enzymes such as proteases occasionally are used but their use is highly questionable since they may lead to clostridial fermentation and or the production of butyric acid. Amylase enzymes may be of benefit in corn silage inoculants but typically there are more than adequate levels of sugars in corn silage and therefore of questionable benefit.

The purpose of adding enzymes and potential benefits are twofold. First, the addition of enzymes can breakdown complex carbohydrates in forages such as starch, cellulose and hemi-cellulose and produce sugars which the lactic acid producing bacteria can utilize to produce the lactic acid responsible for pH drop. Second, these same enzymes may either increase the digestibility of the fiber portion of the silage or result in a fermentation that preserves more of the digestible fiber for rumen micro-organisms to utilize when the silage is fed.

Crops that benefit the most from the addition of enzymes would be those where naturally occurring sugar levels may limit the ability of either the epiphytic or naturally occurring lactic acid bacteria or the lactic acid bacteria added as an inoculant. The crop most likely to benefit in terms of increasing the supply of fermentable sugar would be alfalfa haylages.

The benefit from adding enzymes to improve fiber digestibility although less well documented has been observed in all forage crops. The preferred enzyme type for improving overall fiber digestibility is hemi-cellulase. Hemi-cellulose is composed of various components including a "backbone" of xylans and arabinose side chains. The arabinose side chains typically are more digestible than the xylan back bone. As a result, enzyme mixtures that concentrate on breaking down the xylan back bone of the hemi-cellulose has a better potential to increase both the sugar content of the forage and improve digestibility.

Dr Pat Hoffman and Dr Richard Muck of the USDA Forage Research Center have written, **"Enzymes can improve silage fermentation when the substrate (e.g., sugars) is limiting. Soluble sugars are required to help bacteria produce lactic acid, which is required to lower silage pH for proper fermentation. Generally, enzyme addition to silages has a small positive effect on fermentation."**

CONCLUSION : Enzymes are a cost effective supplement to be considered when used in combination with a quality silage inoculant. Enzymes help insure the lactic acid bacteria responsible for pH drop, have an adequate supply of sugars plus enzymes may help improve subsequent fiber digestion at feed out.

For more information on Adding Enzymes To Silages check out
http://www.uwex.edu/ces/crops/uwforage/Adding_Enzymes_to_Silage.htm