Choosing the Right Inoculant

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Considering all the variables associated with forage production, choosing the inoculant that provides the best solution can be very challenging. Yet this decision is very critical to assure the desired outcome is achieved.

First and foremost, the different types of inoculants and how they work must be reviewed. There are essentially two types of inoculants; homofermenters and heterofermenters.

Homofermenters

These are the most popular inoculants used in the industry. Homofermenters simply convert sugar to lactic acid. These are popular for multiple reasons:

1. Homofermenters are very efficient. The results are improved dry matter recovery and less energy (sugar) loss during the fermentation process.
2. Numerous research studies have also supported improved animal performance.
3. Very good choice for alfalfa and grass silages.
4. Fast fermentation, usually complete in 7-21 days.

Heterofermenters

These are relatively new to the industry having become popular in the last 10–15 years. Heterofermenters will convert sugar into lactic acid, acetic acid, or other organic acids. Carbon dioxide is also produced which means dry matter is lost, resulting in a much less efficient fermentation. Heterofermenting-bacteria generally produce a fermentation characterized as slow (55–65 days) and inefficient. However, these inoculants have risen in popularity due to their ability to consistently increase bunk life/aerobic stability.

So which acid is best and why? Again, there is not a simple answer to this question. It depends on the situation, challenges, and desired outcome. Following is a brief description of the differences between the acids.

- **LA - lactic acid**
  - **Stronger acid, will drop the pH further & faster**
  - **Sweet acid, has been proven to enhance palatability and increase feed intake**
  - **Weak aerobic stabilizer, during feed-out the feed tends to be less stable**
  - **Fermented by the rumen bacteria, therefore, animal performance is often enhanced**
- **AA – acetic acid**
  - **Weak acid, will not drop the pH as low as LA**
  - **Good aerobic stabilizer, feed will remain cool under stressful feed-out conditions, especially when there is a heavy yeast load, typically found in corn silage**
  - **Not fermented by rumen bacteria**

Since the key advantage to heterofermenters is aerobic stability, you need to determined if this is a desired outcome or value. Most aerobic stability challenges can be corrected with forage best management practices (BMP's). If there is a challenge that cannot be corrected with sound forage BMP's, then heterofermenters may be the best choice. If the feed is consistently aerobically stabile and improved forage quality is desired, then homofermenters are the product of choice to increase LA production.

The most common homofermenters are *Lactobacillus plantarum*, *Pediococcus acidilactici*, *Pediococcus pentosaceous*, *Enterococcus facium*, and *Lactococcus lactis*. The most common heterofermenters are *Lactobacillus buchneri* and *Lactobacillus brevis.*

Choosing the form of inoculant is an often contemplated question. Either water-soluble or dry inoculants have been proven to work effectively. However, the most critical and often overlooked aspect is bacteria viability. The bacteria must be alive when applied to the crop in order for them to work. These bacteria must be cared for properly to assure they are viable at the time of application. Store them in a cool dry location, preferably in a refrigerator. Once a package has been opened, dry or water-soluble, it should be used quickly (within 2-3 days). If the package cannot be used in this time frame, then unused product must be stored in a refrigerator or freezer to reduce exposure to heat, humidity, and air.

Cost, package size, ease of storage, and application equipment designed to enhance bacteria viability lend themselves to the water-soluble form. There is also research that supports the water-soluble form is easier to apply uniformly. Bacteria in liquid form will begin working quicker than dry forms as well.

Even though water-soluble forms are popular with the customer, there are challenges associated with them. The water source is critical. It should be clean and free of undesirable bacteria. Chlorinated water can typically be used as long as the level of chlorine does not exceed 1 ppm. Consult the provider to ensure the product in question can be used under these circumstances. Once the bacteria and water are mixed the solution must be kept cool. New liquid application equipment has been designed to ensure bacteria are alive and viable at application.

Dry forms are popular because of the ease of application, there is no water required to mix or tanks to nurse. Simply empty the bag into the applicator and go. Even though the cost is typically higher, some will prefer this convenience.

There are challenges associated with dry products as well. With water-soluble forms the water performs as the carrier/distribution media. Dry products are delivered with their own carrier/distribution media and are ready to use. Therefore, the package size to treat the same amount of forage increases dramatically with the dry, ready-to-use form. Storage and maintaining inventory are essential, but keeping a large amount forage additive cool and dry can present some challenges. Large walk-in coolers are typically not available or practical. Once the dry product is placed in the applicator it should be used quickly as the bacteria are susceptible to the negative environmental conditions as well. Bacteria left in the applicator beyond three days will experience stress and most likely will no longer be viable.

In closing, it is always best to consult with a knowledgeable inoculant provider to determine which product and form is best for your particular situation.