

# Developments in Silage Inoculants

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**When ensiling forages such as high moisture corn or reconstituted grain, the main outcome is to produce a palatable, waste free and high-quality product. The two key requirements are to reduce the pH of the ensiled crop quickly and exclude oxygen. Failure to do so will result in spoilage, waste, loss of nutrients and potentially be a source of mycotoxins. Well-made silages will improve animal performance and when incorporated in a “rumen friendly” management system can also improve animal health.**

Ensiling is a process of crop preservation by acidification. The fermentation is an anaerobic process (no oxygen) during which sugars in the crop are converted to organic acids such as lactic, acetic and propionic. The organic acids are produced by bacterial activity. The addition of specific bacteria via an inoculant ensures that the fermentation is rapidly dominated by beneficial bacteria. The aim is to have a rapid initial drop in pH down to approximately pH 4.0. This ensures that spoilage bacteria do not have an opportunity to proliferate, as they can only become active at a higher pH.

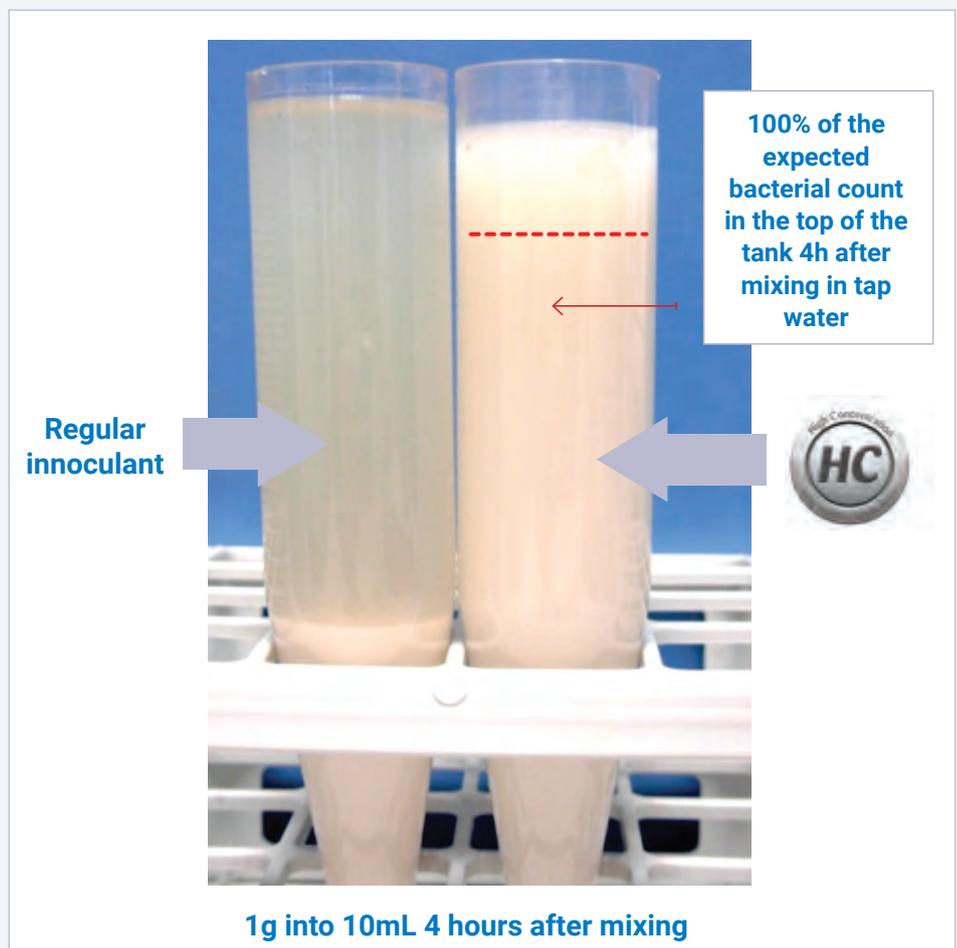
The use of inoculants in forage preservation is now a very common practice. Silage inoculants were developed as a way to guide the fermentation of feeds. The goal of a silage inoculant is to provide specific bacteria that will grow rapidly, will dominate the fermentation and will produce the correct fermentation acids to make good quality silage.

There have been a number of specific developments in the effectiveness and efficacy of silage inoculants in the last few years. Silage makers face two major challenges when it comes to preserving forage. At the

time of ensiling, or the ‘front end’, silage managers need to achieve rapid preservation for maximum recovery of nutrients and minimum DM loss or shrinkage. At feedout (or the ‘back end’), silage managers have to ensure good aerobic stability to minimise wastage, nutrient losses and obtain the best performance from their animals.

One significant improvement is the advancements in aerobic stability of silages at feedout is the introduction of *Lactobacillus buchneri* 40788 bacteria. Inoculant containing *Lactobacillus buchneri* 40788 is one of the most powerful silage fermentation bacteria

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tested to date. It consistently reduces heating and spoilage by yeasts and moulds in a range of forages and total mixed rations. *L. buchneri* 40788 treated forages are more stable at feed out, have less waste and deliver more forage to feed, have better animal intakes and improved hygienic feed quality. This is achieved through the production of acetic acid in a controlled amount along with lactic acid. Acetic acid is a powerful inhibitor of yeast and mold growth, so *L. buchneri* 40788 inoculant is very effective in controlling aerobic spoilage of silage.

The advantages of creating silage that is aerobically stable include improvements in forage palatability, less potential for mycotoxin production and greater gains in intakes and digestibility compared to silage that has aerobically spoiled (i.e. heated and/or gone mouldy). Feeding spoiled silage (even in small amounts) can have drastic effects on animal performance and should be avoided at all costs.

Other developments in forage inoculants are the addition of specific enzyme packages. The specific enzymes that are used in forage inoculants act by breaking down the tough hemicellulose fibres that hold the cellulose fibres in a 'bundle'. This provides a source of fermentable sugars to drive the ensiling fermentation process. By breaking down hemicellulose fibres, this results

in increased surface area which allow the rumen microbes to break down the exposed cellulose, thus creating increased energy availability in the rumen. By breaking down cellulose, (to produce the soluble sugars) this also has a positive effect on both the NDF and ADF in the forage especially in higher NDF grasses. Added specific enzymes can be especially helpful when plant sugar content is low or in high NDF forages. These enzymes increase dry matter recovery and dry matter digestibility of the feed. Quality inoculants will contain specific enzyme packages.

With silage harvesting machinery becoming more powerful and faster all the time, we have seen significant developments in the harvesting rates of forage choppers. Traditional silage inoculants are designed to be applied at higher rates of 0.5 to 2.0L/t which would mean a consumption of 100L of water per hour for a fast harvest. This has seen the development of High Concentration (HC) inoculants as more and more low volume inoculant applicators are available in the market (20ml to 50mL/t). These type of applicators are designed for silage inoculants to be used @ 1g/t. HC technology is the result of a new formulation combined with an improved production process. HC products are highly soluble even at 1g into 10 mL, have a very slow sedimentation vs other

products and are very concentrated. HC inoculants maintain in suspension in the tank and do not settle out on the bottom ensuring an even application of inoculant is given to every tonne of forage. HC technology allows homogeneity of the bacteria in the solution over the time and avoids sedimentation and loss of bacteria viability.

Another key is to make sure the inoculant you are going to use has good research documenting its' efficacy. Multiple university research trials over different years and growing conditions on the forage type you are inoculating is highly desirable. This research backed up with field experience in your area is ideal. Find the inoculants that are backed by service, technology and research.

The final key is to make absolutely certain that you buy the silage inoculant from somebody who will ensure the product is put on the forage correctly. The right applicator has to be mounted on the chopper to make sure too much heat doesn't kill the bacteria. You must have somebody who will make sure that all of these steps and others are taken to ensure your silage success. If you won't get this kind of service from your inoculant provider, you need to use another inoculant. ■ ■