

Importance of mixing inoculants and cleaning applicators

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The use of silage bacterial inoculants has increased over recent years and is supported by many years of research and development of products to increase the rate of fermentation, reduce nutritive and dry matter losses and others which delay the onset of aerobic deterioration, resulting in increased animal production. However, farmers sometimes believe that the inoculants have not worked and there could be several reasons for this.

Maybe a reason for the inoculant not seeming to work is because of incorrect mixing procedure when added to the applicator tank or the length of time before being used after mixing. Perhaps it was or due to clogged delivery lines and/or jets by slime-causing organisms referred to as biofilm. Each product will have its own specific instructions on how to store the unopened package, how to mix it correctly and how to store unused product and how long the mixed product will survive.

This article will address the issues mentioned above however, be aware that failures can be due to several other causes not covered here. They could include such factors as incorrect application rate, town water high in chlorine or fluoride, poor incorporation into the forage at harvest, wrong storage method of inoculant pre-application, wrong product for the particular purpose, etc.

Mixing inoculants in water

Believe it or not, to produce a well mixed tank full of water containing most inoculants requires the inoculant powder to be added slowly to water with continuous agitation. This reduces the tendency of the inoculant powder to form lumps. Don't throw the inoculant into the tank and just add the water.

Always pre-mix the inoculant powder with five to 10 litres of water and agitate the water continuously while doing so. Using luke warm water, if available, will enable the inoculant powder to disperse more easily but never use hot water! Continuously agitate by stirring or shaking for at least one minute to ensure the powder disperses.

The original silage additives were designed to be applied at rates of 0.5 to 2.5 litres per tonne of forage requiring over 100 litres of water per hour, an impost when harvesting flat out. As a result, low volume applicators were developed, and continuing to be refined, to apply 10 to 50 ml/tonne fresh weight. Recently, some applicators with further development can now apply as low as one gram/tonne! Some products have been difficult to dissolve and prone to sedimentation and have sometimes caused problems with achieving an even application on all the forage.

With these ultra-low volume applications, a narrowed supply line can dramatically affect application rates as would one or two blocked jets on a three or four jet bar. To

make problems worse, recent research has shown that some products can settle on the bottom of applicator tanks within hours of mixing. So unless the tank is agitated regularly, the actual application rate of inoculant bacteria will be well below required levels and won't be effective. Driving around the paddock will certainly keep a tank stirred but check the bottom of the tank now and then, and after a lunch break or especially overnight.

Cleaning applicators

Over time bacterial inoculants can cause the build-up of a slime in the applicator system caused by organisms and is referred to as a biofilm. Why does this occur?

Inoculant mixes are sometimes held in applicators (tank, lines, jets) much longer than recommended, especially when weather causes a delay or when carried over between jobs. These biofilm organisms are frequently found in spray lines, strainer canisters and jets. If adding a new mix of inoculant to an applicator which already has an established biofilm population, the applicator will clog more quickly (sometimes within hours) than in a properly sanitised one. However, slime forming biofilms can be controlled with proper application sanitation.

Guidelines for proper sanitation of applicators

Always thoroughly rinse and flush applicators with clean water between batches of inoculant mixes. It is suggested that the applicators are sanitised between cuttings or when an applicator will be stored for more than two days without use. Your own experience will also guide you to a more practical period by being on the alert for problems.

One manufacturer of silage additive applicators recommends using a household chlorine bleach at a rate of two tablespoons (15 to 30 gram) per four to five litres to effectively sanitise applicators. To be effective this solution should ideally have at least 20 minutes of contact time with the applicator spray lines, screens and nozzles. and works best in equipment that is already relatively clean. Stronger solutions, up to four tablespoons (60 gram) of bleach per litre of water, or longer contact times will remove heavier build up of problems such as algae or mould.

It is important to remove all traces of the bleach as it can kill inoculant bacteria. Consider double rinsing after sanitizing to remove all traces of the bleach solution. Don't store applicators for long periods with bleach solutions in them because it may weaken some plastics or corrode metals.

Please don't underestimate this advice.

Some liquid inoculants contain an insoluble stabiliser and once in suspension it is rendered inert and no longer essential to the effectiveness of the inoculant. The material may precipitate out of solution as a thin white film after a few hours of storage if not regularly agitated. Although this precipitate has never been known to plug or damage an applicator even under severe abuse conditions, proper applicator cleanliness will limit accumulation of this material.