

# Use of Inoculants and Preservatives in Baling Hay

## Fact Sheet

Producing quality, dry hay can sometimes be challenging for hay producers. This can lead growers to consider using inoculants and hay preservatives. While these additives have their role in the hay production system, it is important to know when their use is appropriate and what impact they may have on the quality and marketability of your product.

### Important Considerations When Using Inoculants

If you're considering inoculants, you should keep in mind:

- The value of your hay crop weighed against the cost of setting up an applicator and using additives.
- Whether the market and end user will accept treated hay. Some chaff mills, export markets, and domestic buyers may not accept hay treated with additives.

### Situations Where Additives May Be Suitable

#### • Inclement Weather During the Curing Period

Inclement weather can make it very difficult to produce quality hay using standard methods.

#### • Drought Conditions During the Crop Growing Season

Drought can lead to crop failures, where the only viable option may be to make hay. These "failed crops" are particularly challenging to dry due to the presence of stems with nodes and cereals with seed heads still in the boot.

### Why Use Inoculants?

Using inoculants and preservatives offers several benefits:

- Reduces or prevents mould growth.
- Shortens time in windrows.
- Extends baling hours.
- Improves hay quality and palatability.
- Helps maintain the hay's green colour.

Protein hays such as lucerne and vetch baled at slightly higher moisture levels enable the production of higher-quality hay due to reduced turning requirements, a softer texture, greener colour, and better leaf attachment, all of which are desirable to hay consumers.

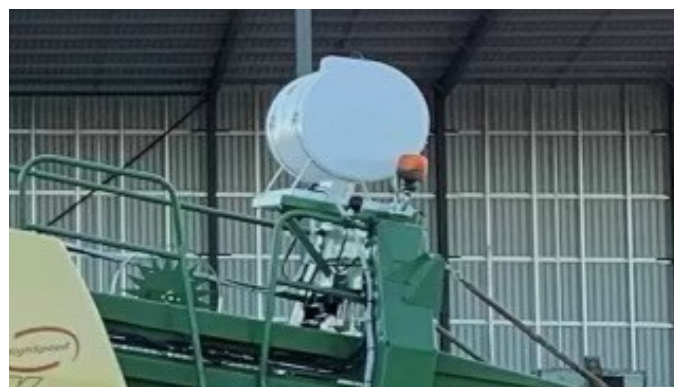


Photo: inoculant tank on baler



This Lucerne hay was baled with excessive moisture and photographed three weeks later. The issue only became apparent once the front bales were removed, revealing a leaning stack and a distinct aroma indicative of problems.

## Ideal Storage Moisture Ranges for Hay

Ideal storage moisture levels vary depending on bale size.

Bale Size	Ideal Storage Moisture Range
Large square bales	12-16%
Small bales	16-19%

When moisture levels exceed these ranges, the use of a hay preservative or inoculant may be considered; however, if moisture exceeds 25%, risks greatly increase and we do not recommend making hay.

## Key Differences in Additives

### Bacterial Inoculants

Bacterial inoculants are designed to introduce more 'good' bacteria to aid in rapid fermentation and to reduce dry matter losses by improving aerobic stability (i.e., stopping mould growth). Most hay already contains these bacteria naturally, as they come from many forage plants, but inoculants increase levels.

Always use hay inoculants rather than silage inoculants, as the latter rarely work effectively on hay. Inoculants can help mitigate small errors and allow you to bale hay at moisture levels that are 3-5% higher than normal levels, up to 25%

### Organic Acids

Organic acids are the most common type of hay preservative, with propionic acid being the most widely used. Preservatives with high propionic acid content are effective in reducing spontaneous heating in moist hay. Ammonium propionate (buffered propionic acid) is often recommended over pure propionic acid because it is less caustic. Some products may also mix propionic and acetic acids. Propionic acid is highly effective against mould growth, while acetic acid targets bacteria and yeast. Unlike inoculants, preservatives do not improve hay quality; rather, they maintain it and help prevent spoilage.

The rates of acid required depend on the hay's moisture content and should be applied as uniformly as possible up to a maximum of 30%

Applications are typically made using an aftermarket spray system mounted near the baler pick-up. Proper application of preservatives depends heavily on using the correct rate, which is influenced by moisture content, bale size, and the quality of forage.

**“ In university-controlled studies, bacterial inoculants often failed when hay moisture exceeded 25%, and organic acids failed above 30%. Going over these levels greatly increased the risk of fermentation and fires. ”**

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Photo: Checking moistures in the paddock.

## Testing Moisture Levels in Windrows

Moisture levels in windrows can vary, which means moisture estimates may not always be precise. The easiest and recommended method to measure moisture percentage and dry matter is the Microwave Oven Test.

### How to Perform the Microwave Oven Test

- Obtain a representative sample from the crop, taking portions from several locations in the paddock. Keep in mind that hay underneath is often wetter.
- Chop the sample into 5-10mm pieces and mix thoroughly.
- Weigh a representative sub-sample (ideally 100g), record the weight, and place it in a thin layer on a "microwave-safe" container.
- Place a glass of water and the sample in the microwave and heat for 2 minutes. (Not using the glass of water may result in a fire. Ensure the weight of the water is less than that of the sample being dried.)
- Remove the sample and weigh it. Stir and place it back in the microwave.
- Repeat the drying process in 30-second increments until the moisture loss is less than 3 grams, the weight no longer changes, or the sample starts to burn.

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