Animal Health International Inoculant Team Newsletter

ENHANCING FEED QUALITY

FALL 24

Ensiling and preparing to feed weather-challenged crops

Weather patterns across the United States have stressed many crops growing in the field. Some regions and forage crops have experienced prolonged high temperatures and drought. Other regions faced excess heat and humidity, along with localized and intense storms. The latter brought various combinations of wind, hail and heavy rain, leading to flooding.

Discussions between the farm team are needed to assess which crops should be harvested and for what feeding purpose. Those deemed “salvage” should not be used for transition cows or highly productive lactating cows. Those crops that can be considered “clean feed” are suitable for any life stage of cattle. Remember to target the right stage of growth at harvest and dry matter (DM); see Table 1, on page 2.

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Bacterial silage inoculants vs. direct application organic acids: What’s the difference?

Dr. Keith A. Bryan, Technical Service Specialist at Novonesis, reviews the differences between these two options for silage management.

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Five considerations for fall baled hay cuttings

What are some of the best ways to maximize quality, and sale price, for the last hay cutting of the season? Jeff Orwig, Western Regional Sales Manager at International Stock Food, outlines five things he has seen that make a difference.

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Protect valuable silage yield

High quality silage supports animal health and growth. Felipe X. Amaro, Ph.D., PAS, Global Technical Support and Research and Development at Passion Ag, shares strategies that manage oxygen levels to preserve silage yield.

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Ensiling and preparing to feed weather-challenged crops (continued)

Table 1: Ideal silage harvest targets		
Crop type	**Stage of growth**	**Dry matter level (DM, %)**
Legumes	Bud or 1/10th bloom	35 - 40
Grasses	Boot	35 - 40
Small grains	Boot	35 - 40
Corn (whole crop)	½ to ⅔ milkline	32 - 38
High moisture corn or cereals	-	68 - 74
Sorghum and sudan	Boot	32 - 37

More information can be found in Lallemand's Silage Mangement Technical Guide.[1]

Drought-stressed crops

Assuming there is sufficient crop to harvest, there could be potentially toxic nitrate levels in the plants. Delaying harvest four to five days after a drought-ending rainfall allows the plants to metabolize some of the accumulated nitrate reserve. In whole-plant corn, a high proportion of the residual nitrate is in the lower third of the stalk, so higher cutting heights at chopping will significantly reduce nitrate in the harvested crop (12-18" off the ground). Of course, there is a trade-off with implementing that practice. With higher cutting heights, there is a reduction in yield and overall tonnage and that will impact overall silage inventory. However, you will harvest the most valuable and nutrient dense portions of the plant and have lower nitrate levels.

Drought-stressed crops tend to have lower levels of natural lactic acid bacteria (LAB) resulting in poor fermentation. The use of a research-proven homolactic lactic acid bacteria (hoLAB) inoculant applied at 100,000 colony-forming units (CFU) hoLAB per gram of fresh forage will ensure an efficient fermentation in drought-stressed crops. *Pediococcus pentosaceus* NCIMB 12455 is one specific strain of hoLAB that can help expedite a reduction in residual nitrate levels by up to 40%.[2] Ideally operations should leave the ensiled crop undisturbed in the pile or silo for a month or more, which will allow the nitrate reduction process to occur.

Prolonged drought also leads to higher spoilage yeast and mold levels. This case would need a bacterial forage inoculant that can improve feedout and stability of the silage. A high-rate *Lactobacillus buchneri* 40788 (LBuc) inoculant is preferred, which would deliver 400,000 CFU per gram of forage coupled with a 100,000 CFU of a hoLAB.

Make your feed teams aware that high nitrate content crops are more likely to have the dangerous silo gas (nitrogen dioxide, NO_2) produced. This gas is a dark yellow or orange color, is heavier than air and smells like bleach. If present, it is especially common to appear in the few days of fermentation, in some cases up to 10 days after sealing. This gas is very toxic and extreme caution should be used. If the silage must be fed within 10 days of ensiling and there is reason to suspect silo gases are present, consider the use of respirators.

Higher cutting heights at chopping will significantly reduce nitrate in the harvested crop.

Flood-damaged crops

Flood-damaged crops present unique challenges. Infestation with multiple undesirable microbial contaminants, such as enterobacteria, clostridia, listeria, bacilli, molds and spoilage yeasts, and possibly mycotoxins could be present. In addition, there will be silt and soil contamination in the lower parts of the plant, which makes the silage harder to ferment and that shows as high ash levels at testing. The silt is the initial vector for the microbial contamination and may lead to an array of fungal diseases not normally seen in healthy whole plant corn. The high ash levels will also reduce the energy level of the crop, may contain very high amounts of antagonistic trace elements such as iron and aluminum among others and be abrasive along the animal digestive tract.

The farm team should agree which acres can be safely and usefully harvested. This will depend on these four criteria:

- When the flooding occurred, and the severity
- The amount of silt contamination within and on the crop
- The overall look of the crop, and if there was lodging
- Whether ground conditions have improved enough for the harvest equipment to get in and out safely

Ensiling and preparing to feed weather-challenged crops (continued)

It is recommended to harvest at the proper DM (Table 1) and be prepared to harvest whole plant corn higher to leave the high ash and silt contaminated stalk base in the field (12 - 18" off the ground). If possible, ensile this crop in a separate bag, bunk or pile. This will be one of the most contaminated and difficult crops to ensile successfully. It demands an effective and proven hoLAB + LBuc combination inoculant at 500,000 CFU per gram of forage.

Do not cut corners on sample analyses before feeding this material. If the analyses identify any problems, avoid feeding to transition cows. Feeding inclusion rates may also need to be lower than usual for other cow pens; dilution can be part of the solution for compromised silages that have to be fed. When introducing a compromised silage in the ration, watch for cow pen responses in DM intake, milk or component yields, higher somatic cell counts, or unusual fecal texture and variations.

Implementing your plan

With care, an engaged farm team can navigate the potential pitfalls to make a wide range of usable silages. Here are five easy things to do to set your operation up for success:

1. Meet with all key farm team members to create a harvest plan tailored to your specific weather-related growing challenges.

2. Use research-proven and effective hoLAB and LBuc combination forage inoculants at the correct application rates. Forage inoculants can help ensure a successful ensiling fermentation and great stability and shelf life during feedout.

3. Be safe. Harvest is fast and there are a lot of different people who might not normally be present on your operation. When dealing with drought-challenged crops, be aware of the potential for noxious silage gases. Please exercise extreme caution and wear respirators.

4. Analyze your silage often. A comprehensive NIR test is required to properly assess the nutrients available with each silage. Depending on your specific weather-related growing challenges, these additional analyses might be prudent: wet chemistry analysis, nitrate content, mold and yeast counts, mycotoxin screening and mineral and trace element analysis.

5. Adjust your rations and monitor the cows. Your nutritionist will make ration adjustments specific to your silage analysis results and inventories. Including probiotic feed additives will be helpful when feeding compromised silages and maintaining animal health and performance. The cows will tell you how successful your management and feeding adjustments are through observations of intake, behavior, health and performance levels.

Now is the time to set your operation up for a successful and safe silage harvest, even when Mother Nature might not have cooperated.

References
1 Lallemand Technical Guide. 2020. Silage Management Technical Guide.
2 Lallemand Technical Bulletin - FUSE010. 2021. Managing and feeding drought-stressed corn and the danger from nitrates.

LALLEMAND ANIMAL NUTRITION

Considerations for fall cutting baled hay

Jeff Orwig, Western Regional Sales Manager, International Stock Food

The 2024 production season is progressing and the market is setting a pretty high price spread between the different grades of quality. The June 28 Idaho Direct Hay Report placed values for premium alfalfa at up to $200/ton with utility/fair quality at $110/ton. As the last cutting of the season approaches, many producers will try to capture this spread by putting up the highest quality possible. Here are a few considerations that can help overcome the unique challenges this cutting can present.

Look ahead to next spring

Producers are encouraged to work with their local agronomist/seed dealer to evaluate stand density and the timing of the cutting. If sufficient time has not passed since last cutting, the root system may not be recharged. This can lead to winterkill and reduced first cutting yield next season.

Adjust cutting height

During the growing season, alfalfa can withstand 2-3 inch cutting height and still have proper regrowth. Increasing the height to 4-6 inches for the last cutting will help protect crowns as well as catch snow.

Keep the windrow wide and conditioned

As day length shortens, it is important to keep maximum exposure to sunlight. It is recommended that the windrow be approximately 70% the width of the cutting area. A wide windrow will help with the first stage of drydown in which the plants lose moisture through open stomata in the leaves. It is also important to keep your mower/conditioner well adjusted to account for lighter volume windrows. A goal of 90% cracked, crimped or mechanical abrasion of stems should be maintained. This is critical for the second phase in which moisture leaves the stems of the plant.

Be aware of seasonal changes to drydown rates

Most producers already know that the fall cutting can be a challenge in achieving a safe moisture level for baling. As fall temperatures drop and humidity levels increase, some hay may not be able to reach “dry” levels regardless of the time spent in the field.

Be prepared for preservative use

After taking all the previous steps into consideration, the addition of Hay Guard preservative can provide the means to capture the value of the last cutting. Hay Guard provides a safe, economical and effective option to bale both alfalfa and grass up to 25% moisture.

HAY GUARD®

Felipe X. Amaro, Ph.D., PAS, Global Technical Support and R&D

Protect valuable silage yield

High-quality silage is crucial for maintaining livestock health, productivity, and farm profitability. It can provide the necessary energy, proteins, and other nutrients for livestock as well as being more palatable, encouraging animals to eat more and maintain good health and productivity. Well-preserved silage is also easier for animals to digest, further helping nutrient absorption and overall health. Corn silage is particularly rich in energy, primarily from its high carbohydrate content, and with a high yield per acre, it is a valuable commodity that deserves to be protected.

Whilst silage films and covers are commonly used, not all of them offer the same level of protection. Opting for a high-oxygen barrier film significantly reduces top losses and spoilage compared to standard PE films, offering a much safer option for preserving high-value forage all year round.

Oxygen – the enemy of quality silage

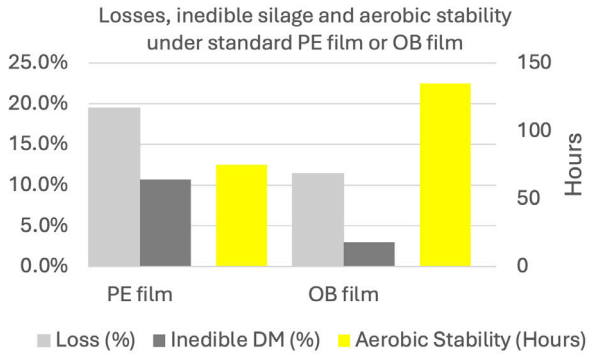
Performance of silage films is measured in terms of “oxygen barrier” – how much oxygen can permeate through the sheet. The less oxygen that can get in, the better. This is crucial because good silage fermentation requires anaerobic storage so that lactic acid bacteria can convert sugars in the forage into lactic acid, lowering the pH and preserving the forage dry matter and its valuable nutritional content. The presence of oxygen allows the growth of unwanted molds and yeasts, and dangerous mycotoxins that can even be toxic to livestock and people. These organisms spoil the silage by literally eating away dry matter, consuming its nutrients, and producing undesirable by-products, such as heat and carbon dioxide, and can cost time in dealing with spoiled or contaminated material. Using a high-oxygen barrier to seal the compacted silage will help maintain an anaerobic environment, protecting high-quality silage that retains its nutritional value and is safe and palatable for livestock.

The presence of oxygen allows the growth of unwanted molds and yeasts, and dangerous mycotoxins that can even be toxic to livestock and people.

Protect valuable silage yield (continued)

Passion Yellow

A high-performance, high-oxygen barrier film, at only 1.8 mil thickness, it is designed to envelop and tightly cling into surface dips and hollows to eliminate air pockets. It then forms a high-oxygen barrier, protecting against oxygen entry 1000 times more than standard PE films. This results in up to 50% less top surface spoilage, and a reduction of inedible silage from the silo by up to 72% compared to regular polyethylene covers. The higher performance effectively retains more dry matter and optimises the fermentation process. An additional advantage is a prolonging of aerobic stability by up to 2.5 days at feed out compared to using standard PE films. Because Passion Yellow is designed to be thin and cling tightly to the surface, it should be protected from UV and physical damage using an additional cover.



Source: WILKINSON J.M. and FENLON, J.S. 2014. A meta-analysis of comparisons between standard polyethylene and oxygen barrier film in terms of losses during storage and aerobic stability of silage. Grass and Forage Science, 69, 385-392. doi: 10.1111/gfs.12087

Passion Combo

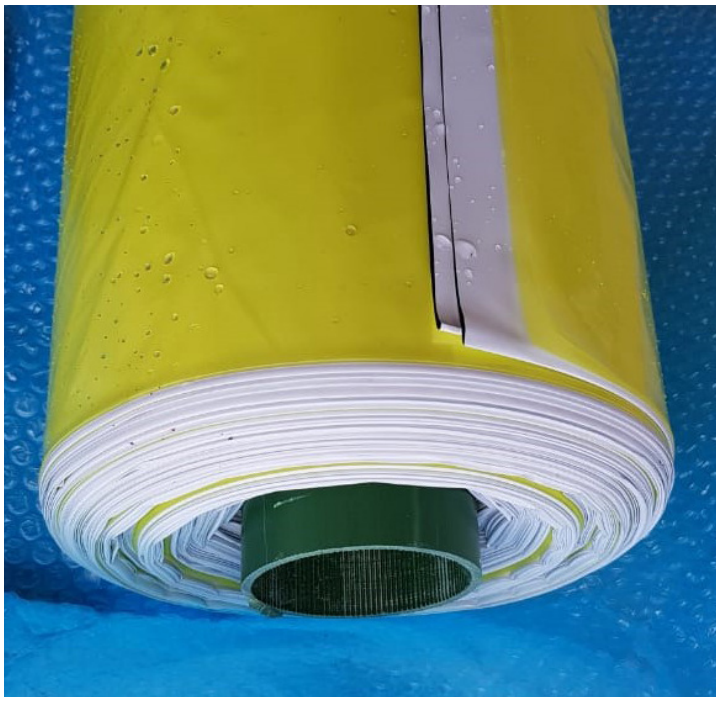
For maximum convenience, Passion Combo combines, in one roll, the high-oxygen barrier of Passion Yellow with an interlayered sheet of 5 mil thick White-on-White.

This combination applies the yellow cling on the silage surface, and the thicker white-on-white layer on top in a single pass over the silage pile or bunker, providing a single, durable standalone solution for both high-oxygen barrier and protection against UV and physical damage without the need for an additional cover.

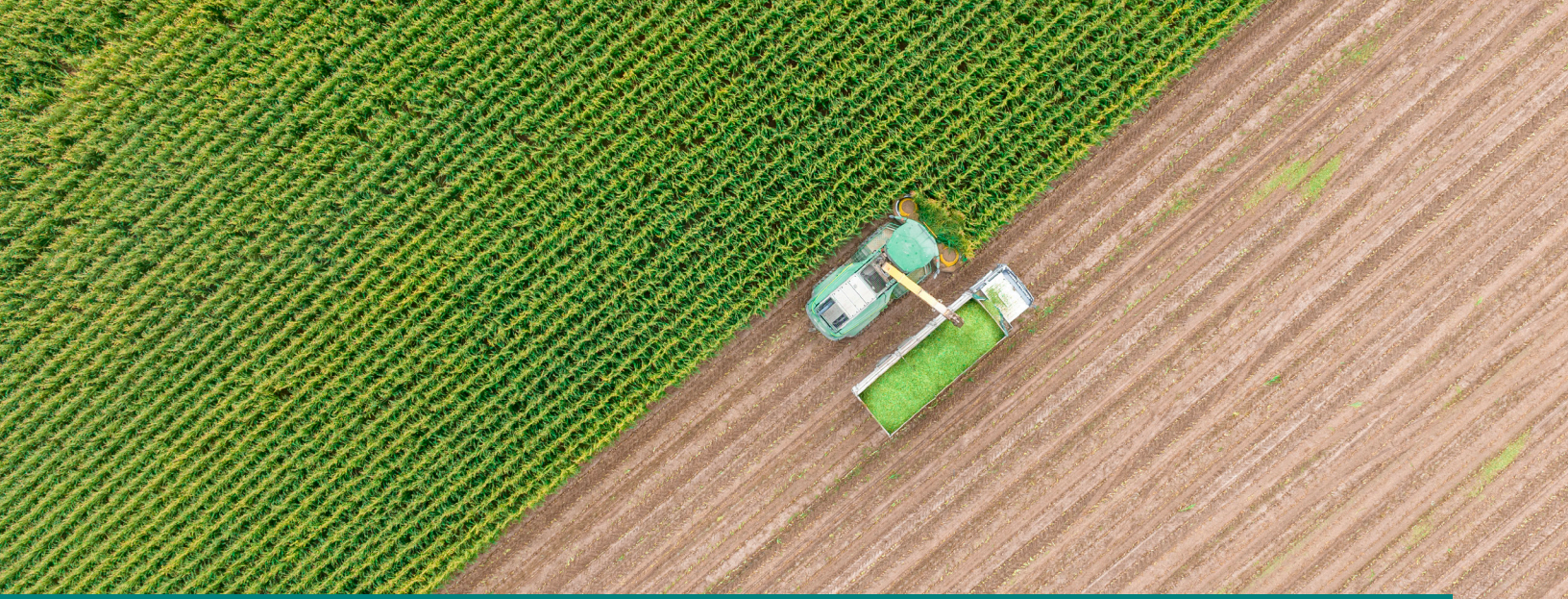
The white top surface helps reflect solar rays to keep the silage cooler, and provides UV protection, further safeguarding your silage.

Passion Combo has a unique folding pattern that enables a smooth pull out across the silo, reducing manpower and time requirements.

Defending against oxygen is a high-return strategy. The relatively low cost of preserving your feed pile will lead to less wastage and higher nutrient content, translating to higher milk yields, animal health and farm profitability.



PASSION AG



Bacterial silage inoculants vs. organic acids

Dr. Keith A. Bryan, Technical Service Specialist

A commonly asked question about silage management is, “What are the differences between using a bacterial silage inoculant versus a direct acidification product such as organic acids, like propionic acid?” This question is most easily addressed once we establish a foundational understanding of the similarities and differences between the two types of products.

Bacterial silage inoculants have been investigated since the early 1900s. The very first silage inoculants were often not viable due to limitations in the microbial technology at the time. The theory behind the use of silage inoculants was that by adding live, viable bacteria we could drive fermentation toward a desirable endpoint. The original theory still holds true today.

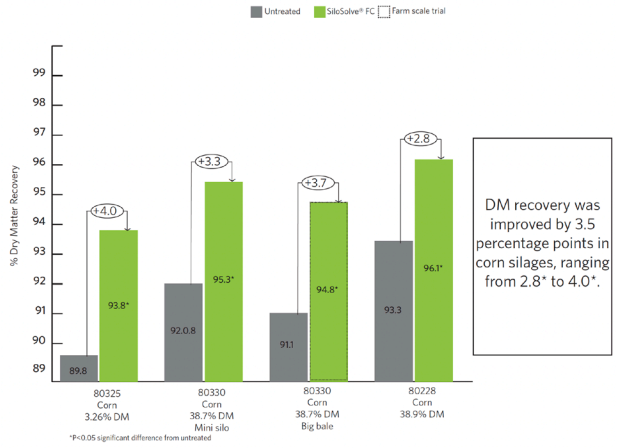
This is accomplished by using specifically-selected bacteria that outcompete the epiphytic bacteria in terms of replication and production of fermentation acids. This efficiency provides for a rapid fermentation that helps reduce energy losses associated with fermentation and dry matter loss.

Lactobacillus plantarum was the dominant silage inoculant species until about 40 years ago when the use of additional species of bacteria was introduced. The different species provided unique characteristics such as production of large amounts of lactic acid early in the fermentation process, or the ability to continue producing lactic acid at lower pH levels. In the mid-1990s, research began on *Lactobacillus buchneri*, which is heterofermentative, meaning it can produce more than one product during fermentation. Simply stated, in addition to producing lactic acid, it produces acetic acid, which helps limit yeast and mold growth and thereby enhances aerobic stability of the silage.

Fairly recently *Lactococcus lactis* O-224 has been included in SILOSOLVE® FC to replace some of the more-established strains. This strain has some very unique properties as it is a superior oxygen scavenger that has enabled early opening of silos in as few as 7 days. Without question, bacterial silage inoculants are generally regarded as safe (GRAS), easy to handle and non-corrosive to equipment.

When reviewing some of the classical data from Bolsen et al. (1992), we see improved DM recovery by 1.3 percentage points, 1.8% more efficient gains and 3.6 lbs. more gain per ton of crop ensiled when a single strain silage inoculant was compared to an untreated control. More recent research has shown improvements of more than 3.5% in DM recovery (Figure 1). A few studies have reported improved efficiency of energy-corrected milk production through the use of science-based, research-proven bacterial inoculants.

Figure 1 SiloSolve® FC improves DM recover 3.5% in corn silage



The research that has been conducted on bacterial silage inoculants by Chr. Hansen* and others overwhelmingly has shown the value of using bacterial silage inoculants. By comparison, research is somewhat lacking for organic acid products. Silage review articles give little thought to the use of this technology. While it can work if used correctly based on moisture, crop type and stage of maturity, it is more cumbersome than inoculants that are proven effective and can be applied at the same rate for all crops.

Bacterial silage inoculants vs. organic acids (continued)

Organic acid products such as propionic acid are direct acidifiers as they decrease the pH of the silage mass directly. This is simply due to adding an acid to the silage mass. Historically, larger amounts were used that resulted in a restricted fermentation. The addition of organic acids can inhibit yeast and mold through antimycotic activity. This simply means that yeast and molds typically do not survive in the presence of organic acids, thereby increasing aerobic stability.

The application rate of acids tends to be variable and is dependent on the moisture of the crop ensiled. Likewise, crops with higher buffering capacity, such as alfalfa, require higher rates of application. If propionic acid is applied in its base form, it can be very corrosive to equipment. As salts of acids have become more readily available, this has become less of a concern. Research using these products is fairly limited and is only applicable to similar crops at similar moistures.

Organic acid products such as propionic acid are direct acidifiers as they decrease the pH of the silage mass directly.

Silage technology has progressed significantly in the last 40 years, evolving from single species (not strain) bacterial inoculants to modern multi-strain inoculants where each strain is selected for a specific purpose. These modern products outcompete the native microflora and facilitate the achievement of ideal fermentation endpoints. While organic acids have had a significant value to silage making in the past, this technology is not able to progress as it is based on acidifying the silage mass, not fermentation. Bacterial inoculants have been proven to improve DM recovery, and enhance aerobic stability, both of which are financially important to operations feeding ensiled feeds.

Inoculants are extensively studied both during development and after a product is introduced. This continued research furthers the understanding of the silage-making process and helps determine what future improvements can be made. This is important for both producers and the livestock they feed as further improvements in silage fermentation can have an impact on animal performance, feed quantity and quality, and the bottom line of the operation. A science-based, research-proven bacterial silage inoculant provides all of the features and benefits of organic acids along with several additional advantages.

*Chr. Hansen has recently changed their name to Novonesis

novonesis

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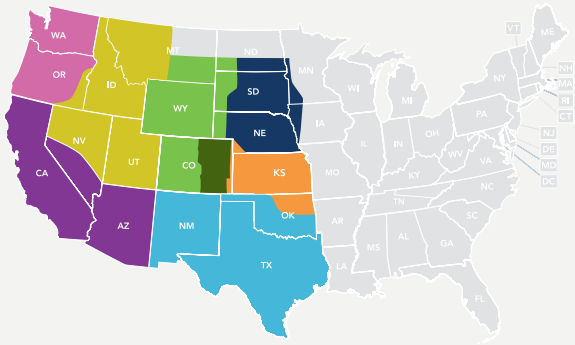

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