



SILOSTOP

THE ULTIMATE OXYGEN BARRIER FILM

Baleage and Bale Wrap Film Questions and Answers

Dr. Tom Chamberlain, Technical Adviser, Silostop

Q: Why make baled silage?

There is a range of reasons to make baled silage (baleage):

- Enables silage to be made on hill and upland pastures that are not easily accessible by large silage-making equipment.
- Bales can be loaded and transported with minimal damage.
- Allows small amounts of specialty forages to be stored as silage.
- Baleage can be a source of long fiber in rations for high-producing dairy cows.
- Allows small amounts of silage to be made; farmers with tight grazing control will often have the occasional field that is surplus to their grazing needs but located in too small of an area to be harvested and ensiled efficiently in a bunker or pile.

Q: What can be baled?

Just about any forage. As with all silage making, the main goal is to produce acid to lower the pH of the forage to preserve it. Higher dry matter silages are stable at a relatively high pH (4.5 to 5.0) and require less sugar in the forage to be converted into acid. Be careful with very coarse and stemmy forages such as mature alfalfa as the stems can punch through the bale wrap film – especially on the corners of square bales. Net wrapping systems are better than twine as they give better and more even compression; in-baler film application will be even better as it will maintain the initial baler compression.

Q: What is the target dry matter content for baleage?

The ideal DM at harvest is 45 to 55 percent. Wetter bales (<30% DM) can lose shape if stacked more than two bales high, and if that happens, the seal can be lost. Drier bales (65% DM) can have a low leaf to stem ratio, a lower density, and a higher mold count.



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Q: What is Silostop bale wrap film?

Silostop bale wrap film is gold in color and is the world's first oxygen barrier bale wrap film. It is thin (0.98 mil / 25 micron) film and reduces the entry of oxygen into the bale. It can be used in exactly the same way as conventional polyethylene (PE) bale wrap, with the same level of stretch and the same basic handling and storage rules.

Silostop bale wrap film is supplied on standard sized rolls that are 29 inches / 750 mm wide and 5,000 feet / 1,500 meters long. The rolls weigh 64 lbs / 29 kg so handle them with care and always stack them on their ends. Film thickness is the same as other bale wrap film, about 1 mil / 25 micron, and it has the same tackiness, stretch and handling, and lasts about 12 months on a bale.

All rolls should be used within 12 months of purchase. Unused rolls should be stored out of sunlight and in dry conditions. Unfinished rolls should be returned to their original packaging, and if possible, used within 6 months.

Q: What are the benefits of the oxygen barrier?

The oxygen barrier in Silostop bale wrap film reduces the rate at which oxygen permeates through pre-stretched film by more than thirty-five fold compared to conventional PE bale wrap film. The effects of having less oxygen under the bale wrap film are:

- Reduced aerobic spoilage during storage. Trials have shown that dry matter loss per bale is reduced by around 40% (from 7.7% to 4.6%) for Silostop bale wrap film compared to the same number of layers of conventional PE bale wrap*.
- Trials have also shown lower yeast counts and fewer molds in baleage stored under Silostop bale wrap, which can not only break down organic matter but also produce fungal spores that can lead to breathing problems in animals. Molds can also produce mycotoxins, which can have a range of clinical effects on different species including abortion, digestive upsets and reduced feed intake and animal performance.
- The lower oxygen level means reduced risk of high counts of listeria in silage.

* The benefits of oxygen barrier bale wrap film are reported by Wilkinson and Fenlon (2013) in a meta-analysis of all publications to date – copies available from Silostop on request.

Q: What machines do Silostop bale wrap film work on?

In 4 years of testing Silostop bale wrap film has worked on every machine used to apply it, including:

- Round balers and square balers.
- In-line wrappers, combined baler-wrappers and monobale wrappers.
- Machines with one, two or more dispensers.



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Q: How many layers of Silostop bale wrap film are needed?

The minimum recommendation for all forages is four layers of bale wrap film (on the circumference). This should be increased to six or more layers for coarse, stemmy forages such as mature alfalfa and summer annuals such as sudangrass or sorghum-sudangrass. When only four layers of film are used, the wrapped bales require careful handling and storage to maintain an airtight seal over the entire surface of the bales. Using only four layers will result in a relatively thin layer of film on the bales so it is important to protect the wrapped bales from physical damage at all stages of production and storage.

Q: Stacking baleage – which way up?

It is best to stack round bales on their flat ends as this has the thickest covering of film, which will not be damaged as easily as the circumference of the bale.

Q: What can cause bale wrap film to break?

Poorly maintained and incorrectly set up machines can cause the film to tear or break in several different ways. Possible reasons are:

- A dirty, overly sticky pre-stretch unit. Over time the tackiness on the bale wrap film can build up on the rollers and catch the film as it passes through. The rollers should be cleaned regularly with mineral spirits or a similar solvent.
- Damage to the roll of bale wrap film. If the ends of the roll are damaged, the bale wrap film might not run smoothly off the roll and might have a tendency to tear. Silostop bale wrap film is wound on plastic cores, which unlike cardboard do not get soggy in rainy conditions. There is approximately ½-inch / 13 mm of the plastic core projecting from the end to protect the film. Although these features will help protect the roll of bale wrap film, rolls should still be handled with care at all times.
- A build-up of dust, soil and mud, lack of grease and lubricant and rough edges on damaged or over-worn metal work can cause tears or breaks in the film.

Q: Where should bales be wrapped – in the field or at the storage site?

Wrapped bales are fragile and can be damaged by handling equipment, stubble in the field and rough surfaces. Ideally the less the bales are handled after wrapping the better. Moving unwrapped bales to the wrapper at the storage site is preferable to wrapping in the field, and bales wrapped in the field should be removed within 24 hours. When selecting a storage site, avoid locations susceptible to spray drift and other chemical contamination as these can denature the plastic film.



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Q: Does the weather matter when wrapping?

Avoid wrapping in the rain as the forage will be wetter and the successive layers of bale wrap film might not stick to each other.

Q: How much overlap is needed between layers of bale wrap film?

The target is a 50 percent overlap between successive layers. This is an overlap of about 12 inches or 300 mm on the bale.

Q: Can Silostop bale wrap film be used with other bale wrap films?

Yes. Various combinations have been tested without any problems but it has not been possible to test every combination. However, avoid mixing light and dark colors as such combinations might behave differently in sunny weather conditions.

Q: How should baleage be sampled?

Several bales must be sampled to get a representative average across the forage. Ideally, sample from the circumference towards the center of the bale using a very sharp 1-inch / 25 mm corer and take repeated 18-inch / 450 mm deep samples. Alternatively take small samples, as the baleage is unrolled at feed out and if necessary cut the forage to a short length with scissors. The forage samples should be mixed in a clean bucket and sub-sampled to the full depth of the bucket.

Q: How does Silostop bale wrap film affect yeast and mold growth?

Yeasts and molds require oxygen to grow. When bales wrapped with conventional PE wrap film are unwrapped for feeding it is common to see patches of white or grey mold growing on the surface, and these patches can extend into the bale. Research has shown that because of the oxygen barrier properties of Silostop bale wrap film, there is less mold on the bale surface compared to bales wrapped with conventional PE bale wrap, especially after more than 6 months of storage. Yeasts and molds reduce the nutritive value of the silage and can produce mycotoxins that can reduce feed intake and cause abortions, other fertility problems, and digestive upsets. Mold spores can be a major irritant and lead to chronic respiratory problems (i.e., Chronic Obstructive Pulmonary Disease), which can also be aggravated by dust commonly found in hay.



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Q: What is the likely impact of Silostop bale wrap film on Listeria counts?

Listeria is a common problem in silage, particularly in baleage. Listeria is a major disease in sheep and goats but less so in cattle. The problems on sheep and goat farms have led to reluctance to make and feed silage, as Listeria infection can become a major cause of mortality. Listeria bacteria grow in wet conditions in the presence of oxygen and prefer a pH of about 5.0 or higher. The conditions found in the outmost layer of baleage under conventional PE wrap film can be the ideal environment for growth of Listeria. Moisture levels are high and enough oxygen permeates through the film to limit the drop in pH and to support the growth of Listeria. Silostop bale wrap film reduces oxygen permeation, which should, in theory, reduce Listeria populations in the bale.

Q: Number of layers versus number of rotations – what is the difference?

With wrapping machines that wrap bales individually, each rotation will cover part of the bale. Successive rotations overlap by 50%, so once the bale is fully covered there will be two layers over the entire surface of the bale. Calculate the numbers of rotations needed to achieve a given number of layers of bale wrap film as follows:

Count the number of rotations needed to cover the entire bale so no forage is showing (typically seven or eight rotations). Then add one to this number.

- For four layers, multiply by two; for six layers, multiply by three; for eight layers, multiply by four; twelve layers multiply by six and so on.

With in-line wrapping machines that wrap many bales in a single long row, the overlap between successive rotations determines the number of layers of bale wrap film. If a stretched roll is 24 inches / 600 mm wide; a 6-inch / 150 mm overlap is four layers of film; a 4-inch / 100 mm overlap is six layers of film; and a 3-inch / 75 mm overlap is 8 layers of film. Most machines will add two extra layers at the junction between bales, as this is the weakest point.



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Bale Wrapping Machine Preparation

Pre Stretch Unit (PSU)

- Ensure all moving parts move, check tension in springs and the reel holders rotate and move. Clean pre-stretch rollers.
 - Remove old tackifiers, clean with mineral spirit or de-greaser.
 - If film sticks here, then 'spiral tearing' can occur.
 - Check the gears that ensure the rollers run at different speeds – check for wear and re-grease. Both rollers should rotate freely when a roll of film has not been loaded.
 - Check turntable belts, bobbins, gearing, and bale sensors.
 - Check cut-and-clamp mechanism – clean and replace worn blades.
- Mounting a roll of bale wrap film – ensure tacky side faces the bale. Most machines should show diagrammatic instructions for threading the film through the rollers.

Bale alignment

- When bale the wrap film goes onto bale, the center line of the wrap should pass through the center line of the bale. Adjust the height of the pre-stretch unit mast as required. Also make sure that nothing on the rotating 'table' catches on the film that is coming off the roll.

Bale shape and size

- Take care when windrowing and picking up the forage to get a cylindrical bale rather than a barrel or cone shaped one.
- Ideally, bales should be a perfect cylinder - not tapering and not bulging in the middle. Misshaped bales can migrate along the wrapping table.

Calibration

- The 'in-field' bale wrapping process is generally too fast to assess visually, so it is important to do 'test bales' before harvest.
- Check the stretch, which is 70 percent for round bales and 55 percent for square bales and in hotter weather. Two marks 4 inches / 100 mm apart on the roll should be 6.75 inches / 170 mm apart on the bale at 70 percent pre-stretch. Repeat this at the top, middle and bottom of the roll.
- Check roll 'neck down'. A 29-inch / 750 mm roll should be 23 to 24 inches / 600 mm wide on the bale.
 - Over stretched – sub-optimal bale protection.
 - Under stretched – bale might not seal correctly.
- Film overlap – the target is a 50% overlap.

Assessing a wrapped bale

- Cut the wrap off the bale as though opening both ends of a tin can.
 - Hold the wrap that covered the circumference up to the light and look for thinner layers - cut out a thinner layer to assess the minimum number of layers covering the bale.
 - Use a sharp knife or sticky-tape covered fingers to separate the layers – count the number of layers.
- Check the bale wrapping machine periodically in the field, particularly if the temperature changes – pre-stretch, roll 'neck down', film overlap and centering are the easiest to check.