

Baleage - The Dry Hay Alternative

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Many Midwest producers make round bale hay due to its many advantages – low machinery costs, multiple storage options, convenient feeding, etc. However, producers too often struggle to produce quality hay due to difficult drying conditions. A humid climate with frequent, heavy rain can also take its toll on bale quality when stored outdoors without cover. An alternative approach is baleage – baled high-moisture hay wrapped in stretch plastic film and preserved by fermentation.

Producers considering baleage often have the following questions: Can bales be made with higher moisture? What additional investments are required? What is the right moisture to ensure quality baleage? How large a bale should be made? Should an individual or tube wrapper be used? What makes a good quality plastic film? How many layers of wrap should be used? What should be done with the film after use?

Most round balers are capable of baling grass and legume forage crops at higher moistures, without modifications, so additional machinery costs are usually limited to the wrapper. Some manufacturers offer additional features to enhance baler performance in high moisture crops including heavy-duty pick-up components to increase durability in heavy windrows, powered scrapers and augers to prevent crop build-up on rollers and stronger belts to handle heavier bale loads.

Most producers know the ideal haylage moisture for bag and bunk silos is ~60-65% moisture, but this is too wet for baleage. This produces a strongly fermented silage. One reason a higher level of fermentation with bunk or bag silos is desired is the level of face exposure during feedout. Since baleage has less feedout exposure, the degree of fermentation required is not as great and successful preservation can occur at lower moisture. Additionally, bales wrapped at this moisture will experience condensed moisture at the interface between the bale and the film. This condensate often causes hay to ferment poorly, producing a ring of unpalatable hay around the bale. The ideal moisture for wrapped bale silage is 45-55%. This provides enough water for adequate fermentation but prevents the condensation problem and unpalatable feed.

Some producers use baleage as an insurance policy. They prefer to make dry hay, but if rain is looming, they quickly bale the crop and wrap it. The bale moisture may be 30-45%, but successful preservation can still be achieved. Research shows that as long as film integrity is maintained and anaerobic conditions are achieved, excellent preservation can occur at these moistures. Some producers refer to this material as “sweet hay” because it has the slight odor of ensiled haylage but actual level of fermentation products is low. Ideally, producers should strive for 45-55% moisture, but low-moisture baleage can be a valuable management tool when weather conditions are difficult.

In terms of the size of bale to make, bigger is always better as long as the bale can be safely lifted with the available handling equipment and the bale can fit in the wrapper. Why is bigger better? Making larger bales will help ensure that more of the hay is safely preserved in the interior of the bale and less is exposed to holes in the film – something engineers call small “surface to volume ratio”. Additionally, larger bales mean fewer bales to handle and wrap, saving time and film.

The choice of tube or individual wrapping is dictated by many factors. Tightly wrapping a tube of bales in stretch film requires about 50% less plastic per ton of hay because the ends of the bales are not wrapped, only the perimeter. Not wrapping the ends also reduces wrapping time by ~50%. However, individually wrapped bales are easy to target feed, they can be loaded onto trucks for transport and sale more readily and because they can be packed tightly together or evenly stacked, they occupy less storage space.

The plastic film commonly used for wrapped bales is a blown low-density polyethylene which is ~1-mil thick. During application, the wrapper stretches the film to 70-80% of its original width to ensure that it clings tightly to the previous layer, resulting in a tight seal. If the film is stretched more than this, the film thickness is compromised and greater oxygen penetration can occur. To avoid high storage losses it is important to buy film from a reputable source so that good mechanical properties are assured. A lot is invested in every bale that is wrapped, so make sure not to scrimp on film quality.

Because every layer of wrap costs money, there is a natural tendency to use as few layers as possible; however, it is important to resist this temptation. An absolute minimum of 5 layers should be used. Increase the number of wraps at lower moisture, as crop maturity increases, when temperatures are high, or when wrapping sharp stemmed crops. More layers of wrap are especially important when bale moisture is <45%. Below this moisture, few fermentation products will be produced, so it is critical that an anaerobic environment is assured by the additional layers of wrap.

Film disposal is an important consideration when making and feeding baleage. Many states ban open burning of agricultural plastics; it is not only bad for the environment, but low temperature burning of plastics can produce toxic gases that can have long term negative health consequences. Although film can be land filled, there are an increasing number of plastic recyclers that will take clean plastic film. To make the film acceptable to recyclers, it is important to keep the film clean after use and to not mix different plastic materials. Each state's DNR website will likely have very useful information regarding recycling ag plastics.

In summary, here are some best management practices that will ensure excellent baleage preservation. Producing quality baleage starts before baling. When cutting the crop, lay the crop as wide as possible and use a properly configured mower-conditioner to reduce the time to desired moisture. Remember baleage should be drier than chopped haylage, so conditioning and laying wide is important. Be careful not to rake soil into windrows if the crop is merged. Soil can contaminate the windrow and produce fermentation problems. Bale at 45-55% (w.b.) moisture and wrap the bales as soon after baling as possible. The sooner the bale starts to ferment, the better the preservation. Be careful to make uniform bale size and shape so that uniform wrapping can occur. Tube wrapping bales of varying diameter can stretch the film between bales, creating a place for oxygen to enter the tube. Avoid baling with treated sisal twine because some rodenticides will cause the film to quickly disintegrate. When using an individual wrapper, wrap close to the storage site and place into storage soon after wrapping. Store bales in a well drained area where animal activity might be reduced. Individually wrapped bales should not be stacked if moisture is >60% because the bales will “squish” too much and pull the layers apart allowing oxygen into the bale. Finally, do not scrimp on the number of layers of film used. An extra layer or two of film does not cost much, but can pay big dividends from reduced spoilage. Making quality baleage does take more management than dry hay, but it can produce excellent quality forage.