Tips for Successful Bale Wrapping & Quality Baleage

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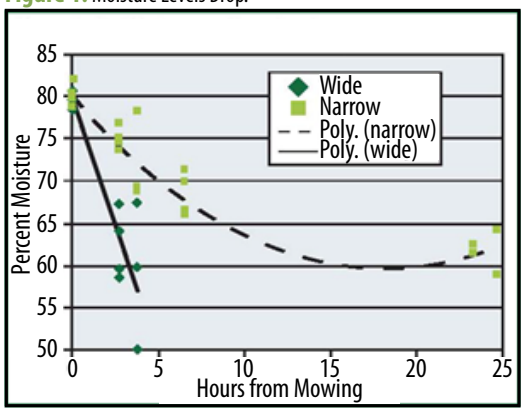
Making dry hay in the Midwest can be challenging, especially during first cutting. May and June bring potential for rain one out of every three days, increasing soil moisture and humidity and creating a detrimental hay drying environment. Because of this, many farmers have chosen to chop some or all of their hay crop. Are there other options? Many farmers are turning to wrapping high-moisture baled hay as well.

Photo: AgTalk

Although often used interchangeably, making quality baleage and simply wrapping large bales is not necessarily the same thing. Making baleage implies fermentation – as in haylage (think of an ideal moisture content of 50-65%). Wrapping bales may serve as a substitute for storage and can be done at moisture levels as low as 15-30%. Any kind of forage able to be baled can be wrapped.

Figure 1. Moisture Levels Drop.



One key to making baleage or wrapping bales is consistent moisture content throughout the windrow. The more consistent windrow moisture is, the more likely bale moisture content will be consistent as well. Greater use of wide swath mowing helps with the speed of hay drying and the uniformity of moisture content within the windrow (Figure 1; T. Kilcer, Hoard's Dairyman).

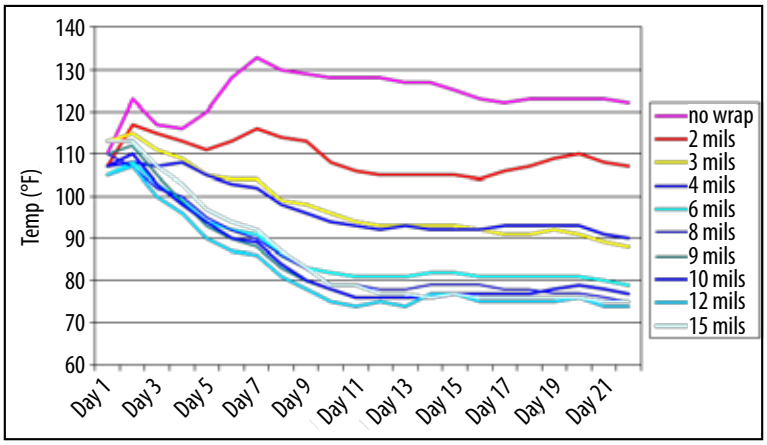
The sooner moisture content of the plant material drops below 65%, the sooner plant respiration stops. Plant respiration uses plant sugars for energy which decreases forage nutritive value and can cost up to $30-40/ton of forage. Also, those sugars are valuable for faster fermentation, whether making haylage or baleage. Faster drying also decreases the time interval from cutting to harvest, decreasing the risk of rain exposure. The goal, if possible, is to have the swath width at least 80% of the cutter bar width.

The second consideration is to make a dense bale. Air provides oxygen which continues respiration. Trapped air in a bale can also lead to excessive heating and possible mold growth (there are molds of different types on all hay harvested, but in small numbers). Much like haylage in a bag or pile, moisture >50% allows for better packing. The same is true in the baling process. Many are also using net wrapping for a more uniform outer surface prior to wrapping.

One thing to keep in mind in making large round or square bales for wrapping is that baling at a higher moisture content greatly increases the weight of the bale. As a rule of thumb, you will double the weight of the bale at 50% moisture. Many large round bales can weigh up to a ton or more. Make sure you have the right equipment to handle the increased weight, such as adequate hydraulics, counter balanced loaders, and good tires.

The last important step in making quality baleage is wrapping thoroughly enough to ensure complete oxygen exclusion. Dan Undersander of the University of Wisconsin and coworkers did some of the early work with wrapping almost 20 years ago. What they found was it takes a minimum of 6 mils of high quality plastic to accomplish this. It also takes a minimum of 6 mils to rapidly drop the internal temperatures in a wrapped bale (Figure 2). These bales were wrapped at 30% moisture, which would make them more susceptible to inadequate wrapping.

Figure 2. Effect of Plastic Wrap Thickness on Internal Temperature of Bale Over Time.



It is not suggested to use plastic heavier than 1.5 mil or using fewer than four wraps because there is a minimum number of wraps needed to achieve overlap of seams to adequately seal the bale. Use good quality plastic with UV resistance. Exposing wrapped bales to the weather and sun for over two years greatly increases the risk of plastic breakdown.

It is imperative to wrap bales as soon as possible after baling. The shorter the time of exposure to the air, the sooner the start of anaerobic fermentation which reduces the loss of dry matter in the form of plant sugars. It will also reduce trapped air in the outer layer and subsequent surface mold growth.

Forages able to be baled can also be wrapped. If you bale at 50-65% moisture, you are more likely to achieve better fermentation. At <50% moisture, and as you decrease moisture, extra plastic layers may be beneficial to exclude air. Drier bales do not make as dense a bale and may have drier stems that could puncture the plastic. They also may not ferment as fast or as much as a wetter bale. However, wrapping dry bales at 25-45% moisture can still allow for adequate preservation, provide more storage options, increase nutritive value over dry hay, and be a lower cost alternative to other storage methods. It can also offer feeding flexibility, but not as much marketing flexibility. Wrapped bales of all types have been fed to ruminants as well as horses at varying moisture levels by University of Minnesota (Martinson; Sheaffer) and U.S. Dairy Forage Research Center (Coblentz) researchers. Wrapping hay bales at 33% moisture significantly lowered mold counts in the baled hay as well. Unwrapped bales at 15-30% moisture are very prone to mold formation and heating, with a potential to cause fire during storage.

Summary

Wrapping bales and making baleage can reduce the risk of adverse weather exposure compared to making dry hay. It can also offer a lower cost alternative for storage and reduce mold. Adequate plastic coverage is imperative to making high quality forage.