Stacking Affects Storage

South Dakota research shows round bales are best stored in rows.

Story & photos by ***Sue Gordon***

Although stacking large round bales in pyramids saves space, it may not be the best method for preserving hay quality, according to forage and livestock specialists.

Admittedly, all hay bales stored outside in unprotected areas can lose hay quality due to moisture from rain and snow. Typically, the outer 4-8 inches (in.) of a round bale will have serious hay quality deterioration. That may sound insignificant, but consider that in a 5-foot (ft.)-diameter bale, the outer 8 in. accounts for about half of the volume. This means 20%-50% of a bale can be damaged by weather under poor storage conditions.

So what outdoor storage method will cause the least weathering to hay bales?

Based on a South Dakota study, storing bales end-to-end in rows appears to best preserve hay quality. The study found dry-matter losses of more than 10% for prairie hay stacked in pyramids, compared to 4% for bales stacked individually and less than 1% for bales stacked end-to-end. Researchers say stacking large round bales pyramid-style tends to trap moisture in them and limits drying from exposure to the sun and wind.

Weathered hay is less palatable and often less digestible; this decreases feed value and reduces rate of gain. Moldy hay can even trigger abortions among cows, says Cody Wright, a South Dakota State University (SDSU) Extension beef specialist.

Fortunately, good management can help minimize hay quality losses in large round bales, Wright says. Here are some guidelines:

Consider moisture content. Hay baled with excessive moisture tends to deteriorate more quickly. Large round bales are best put up at 16%-18% moisture content.

►Stacking round bales in pyramids saves space, but it is not the best method for preserving hay quality.

Make a dense bale. A dense bale will sag less and will have less surface area in contact with the ground. In addition, a dense bale will shed more precipitation and protect the inner part of the bale from weathering.

Realize that stemmy hays such as alfalfa, Sudan and mature small grains generally don't form a good thatch for shedding rainfall, so they deteriorate faster than grass hay. Thus, these forages may need special storage considerations.

Use plastic twine. Twine reduces bale sag, maintains bale shape and provides a tight, smooth surface. Also, plastic twine will resist weathering, insects and rodents better than natural-fiber twines.

Although net or mesh wrapping has become a popular alternative to twine, a Kansas study found it offers no advantage over twine in protecting a bale from weather.

Solid plastic is also an option for wrapping large round bales. The plastic will shed water, but it can also trap moisture in the bale. And, it is more costly than twine. Bales wrapped with plastic should be stored individually to allow the moisture to escape from the ends of bales, researchers say.

Store bales in a well-drained location. Bales soak up moisture if placed on a wet or poorly drained site, causing a large layer of spoiled hay on the bottom of the bale. Select a storage site that is well-drained, such as the ridge of a hill. Where practical, keep bales off the ground using low-cost materials

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like pallets, racks, fence posts, railroad ties, old tires or a 6-in. base of crushed rock. Research has shown that dry-matter losses can be reduced by as much as 10% if the bales are slightly elevated.

Store bales end-to-end. Position bales end-to-end in long rows oriented north-south (if possible) and provide at least 3 ft. of space between rows. This storage combination will provide for good sunlight penetration and airflow, which will allow the area to dry faster after a rain. It should also reduce snow accumulation between rows. In areas with heavy snow accumulations, spacing rows up to 10 ft. apart is advised to allow sunlight to melt the snow.

When lining bales up, put the stem-down side of the bale to the north side. The stem-down side tends to shed rain and snow better than the stem-up side. The stem-up side will then receive more sun to provide some melting and drying to lessen spoilage.

Storing bales with the rounded sides touching is not recommended because this creates a trap for rain and snow.

Bales as windbreaks

If you plan to use round bale rows as snow fencing, orient them opposite the prevailing wind direction to catch as much snow as possible, says Cody Wright, South Dakota State University (SDSU).

For added wind protection, consider stacking the bales in the "Canadian" method — turn one bale on end and then stack another on top of it, as shown in the photo.

A Kansas State University (K-State) study indicates this may be a feasible stacking method. The study found dry-matter and quality losses were similar to those of bales stored end-to-end in north-south and east-west rows. Hay spoilage at the bottom of the bale was higher for this method, but less hay is exposed to the ground. High-density, well-formed bales tied with plastic twine are especially critical for the bottom bales to hold up in these stacks.

►The "Canadian style" of stacking bales includes placing the bottom bale on end and placing another bale on top of it. This method works well for windbreaks.

Avoid trees and fences. Locate bale rows away from fences and tree lines to avoid contact with snowdrifts. Shading and blocked wind circulation from trees will cause more substantial damage to the hay bales than any rain protection trees might offer, experts say. Instead, store bales in an area open to breezes to enhance drying after rains.

Keep grass and weeds mowed between rows so they do not shade the bales or hold snow or extra moisture in the area.

Act quickly. Finally, most hay spoilage occurs early in the storage period, so it's best to get bales out of the field and tightly stacked next to one another before too much rain falls.