

Round Bale Storage 101



PHOTO BY SHAUNA ROSE HERMEL

Unless you are getting your hay for little more than a handshake and a thank you, poorly stored round bales will affect your bottom line.

by Ed Haag

Just because round bales look like they can handle the elements better than square ones doesn't mean improperly storing round bales won't cost you. Unless you are getting them delivered onsite for nothing more than a handshake and a thank you, the one-third loss in dry matter (DM) associated with

poorly stored round bales will definitely affect your bottom line.

"Most recent studies show that [with] low-density round bales stored on the ground, uncovered, up to 61% of the bale's dry matter can be lost in the first year," says Edward Rayburn, forage agronomist with

the West Virginia University Extension Service. "The average loss is 20% to 25%."

Rayburn adds that just because big bales offer less surface area for moisture to penetrate hay, producers shouldn't develop a false sense of security when evaluating storage. When spoilage does occur, the losses can be even more significant in the large bales, which can weigh up to a half a ton a piece.

"If your large round bales are improperly stored and completely ruined, your losses could be significantly more than they would be in a stack of small square bales," he says.

So what can be done to reduce losses and protect one's investment? Rayburn, who has thoroughly analyzed the economic effect of leaving round bales exposed to the elements, says that it can be as easy as keeping them off the wet ground and throwing a tarp or a sheet of plastic over the top of the bale. "Top

Table 1: Effect of storage method on storage losses from large round hay bales

Storage	Dry-matter loss	
	Range	Average
Barn	3%-8%	5%
Additional losses with outside storage:		
Covered on pallet or gravel	5%-10%	8%
Uncovered on pallet	28%-39%	34%
Uncovered on gravel	4%-46%	22%
Uncovered on ground	7%-61%	33%

Source: Ed Rayburn, West Virginia University Extension Service.

covers definitely show the greatest return to the producer," he says. "Average losses drop from 25% to 8%."

Is it worth it?

This does not mean that every person who grows or feeds hay should run out and buy top covers for their round bales. Rayburn notes that hay producers' needs differ dramatically depending on climate, bale density, length of storage, quality and composition of the hay.

"Before deciding on a specific storage system, an operator must sit down with a pencil and work the numbers," he says. "Only then can he make a decision based on sound economics."

For example, in the rare instance that a beef producer can replace lost dry matter with purchased hay of equal or better quality for less than it costs to cover his bales, it might actually make good business sense to pass on the tarps in favor of a couple extra tons of purchased hay.

On the other hand, a beef producer who plans to blend his first cutting of high-protein hay with lower-protein cuttings would be wise to preserve the hay's quality by storing it on a well-drained surface to prevent bottom damage in addition to covering the bales.

Rayburn's general rule-of-thumb is the more valuable the hay, the more can be spent on protecting that value. He notes that when calculating the cost of storage an operator should include the cost of materials, labor and machinery used in wrapping, labor and machinery used to take bales out of storage, cost to dispose of any used materials, and taxes on machinery and structures.

He adds that when making storage decisions a producer should keep two facts in mind: Not all bales are created equal, and the greatest deterioration occurs when lower-density bales are left uncovered in the field.

Storage losses add up

While producers and sellers of high-quality hay are the most likely to experience major losses from not properly protecting their hay, beef producers are also vulnerable. Rayburn cites, as an example, the cost difference between feeding round bales that are stored outdoors, covered and on a gravel bed 6 inches (in.) deep vs. round bales stored outdoors on the ground without any covers.

"Without looking at the actual numbers, it is difficult for some beef producers to really comprehend how much it is costing them

Table 2: Material costs of alternatives for a 1,200-lb. round bale storage system

Storage System	Unit cost	Useful life of storage system, years			
		1	2	3	10
		Cost per ton of dry matter per year			
Barn	\$4.00/sq. ft.				8.00
Bonnet	\$6.12/bale	12.25	6.12	4.08	
Row cover	\$3.96/bale	7.92	3.96	2.64	
Bag	\$12.38/bale	24.75	12.38	8.25	
Wrapped silage	\$1.75/bale	4.38			

Source: Ed Rayburn, West Virginia University Extension Service.

when they leave their bales unprotected," Rayburn says. "When they see the figure they are shocked."

Studies show that in West Virginia, losses for covered bales on 6 in. of gravel are around 8%, while losses for unprotected bales sitting on the ground are around 33%. With a 25% feeding difference between protected and unprotected hay, a rancher would have to produce or purchase 25% more hay to feed the equivalent number

of cattle if his intention were to leave those bales uncovered and on the ground rather than covered and on gravel.

Taking this information to the next level, it is estimated that for 25 dry cows the 180-day maintenance requirement is approximately 55 tons of air-dried hay.

Considering the 8% projected loss for covered bales on gravel, this would mean that a rancher would have to produce 59.8 tons to feed the 25 dry cows. In contrast, if he chose not to cover his bales and stored them on the ground, he would need to produce 82 tons in order to feed the same number of cows for the same length of time.

With a replacement value of \$60 per ton for feeder hay, the final difference in cost between the protected and the unprotected hay (22.2 tons) is approximately \$1,332.

"We are looking at a substantial out-of-pocket expense," Rayburn says. "The question that the rancher should be asking is 'What is it going to cost me to avoid having to pay out the extra money to replace spoiled hay?'"

One cover option

Glen Knopp, general manager of Inland Tarp and Cover, says most ranchers are faced with two options for protecting their round bales — sheds or tarps.

"Building a shed means making a major financial commitment to a single location,"

he says. "With more land leasing and crop rotations happening, ranching is a lot more dynamic than it once was, and that means that a rancher needs to be more flexible." Because of this, Knopp sees a growing number of hay producers and hay buyers opting for tarps.

"A shed can be an excellent, long-term investment, but one must consider hauling costs when hay is harvested off site," he says, adding that in most cases it is a trade-off between the 3% less waste incurred with shed storage and the added flexibility offered by the tarps.

He notes that a typical strategy with savvy beef feeders is to buy hay at the harvest site and immediately tarp it. With arrangements made with the seller for longer-term storage, the new owner can remove the hay as needed, avoiding the necessity of hauling the hay twice.

For Knopp, tarping can play an integral part in a strategy to reduce both bale spoilage and hauling costs. As for responding to the hay storage scenario outlined by Rayburn, Knopp calculates that by stacking round bales in a 3-2-1 pyramid, two 25- x 52-ft. heavy-duty tarps worth \$272 a piece (ropes and cinches included) will cover up to 66 tons of hay. He points out that with the life span on his high-quality tarps averaging four years, the final cost to protect that hay investment would run approximately \$2 per ton and should pay for itself in six months.

No-cost storage tips

Whether or not you choose to cover your round bales, Justin Sexten, Extension beef nutrition specialist for the University of Missouri, has some in-the-field storage tips that won't cost you any additional cash, but will reduce some of your spoilage losses.

"There are some practical, simple steps one can take to avoid major bale spoilage," he says. "It is just a matter of taking the appropriate measures at the right time."

If there is a single message Sexten wishes to convey when discussing round bale

The more valuable the hay, the more can be spent on protecting that value.

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storage, it is the importance of location. “Where you place your bales will have positive or negative consequences on bale spoilage,” he says. “Any benefit is at zero additional cost. It is just a matter of paying attention.”

Sexten says the objective of proper storage is to keep the bale as dry as possible. This means exposing bales to as much air circulation and sun as possible while taking

measures to prevent any surface moisture from entering the bale.

He notes that it is a common mistake for a hay grower to select low-production areas — such as under trees, in shaded areas or along waterways — to store bales.

“Storing hay in these dark, damp environments prevents the sun from drying the hay after a rain and encourages the bottom of the bale to remain wet,” he

says. “Placing bales in known waterways is the fastest way to leach out all of [their] nutrients.”

Sexten’s ideal location for storing bales is in rows on a base of 6 in. of gravel or pallets, on high dry ground, perpendicular to a north-to-south slope with good exposure to the sun.

He recommends orienting rows east to west rather than north to south. “Running

them east to west allows for maximum sun exposure as it moves from morning to evening,” he says. If you go north to south, typically you have one dark side of the bale the entire day.”

Protect those ends

The most vulnerable portions of the bales — the flat ends — can be best protected by butting them together to form cylindrical

rows, Sexten adds. “When you start making a row, bump one end of a bale to the next one and keep doing that.” The tighter the bales are to each other the less moisture will penetrate between the bales.”

He notes that it is of equal importance when starting another row of bales to have a minimum of 3 ft. between the new row and the previous one. “If they are touching, you are effectively creating a gutter,” he says. “As

the water runs off each bale it aggregates in the middle.”

Sexten adds that the space between the rows also improves air circulation and exposes additional surface area to the sun.

Ranchers living in high-snowfall areas should consider extending the space between bale rows to at least 10 ft. to prevent the accumulation of snow between rows in the winter.

