

Round Bale Storage Costs

Ed Rayburn, Extension Specialist,
WVU Extension Service, Agriculture and Natural Resources
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Not everyone uses round bales, but they are becoming more common every year. The shift to using round bales is easily understood if you have spent much time putting up square bales. When comparing the cost of putting up hay as square bales versus round bales, round bales usually win. Machinery time to cut and rake hay is the same for the two systems. A round baler with a manual string wrapper requires the same amount of time to bale an acre of hay as does a square baler. The savings associated with round bales come in getting the hay to storage and in feeding the hay. Moving round bales from the field takes one-half the machinery time and one-tenth the labor of moving square bales from the ground to the barn. A round baler will look even better if you use a larger round baler with hydraulic wrapper. A square baler will look better if you have kicker wagons or run the bales directly to the wagon.

Round bale hay loss is usually due to improper storage and feeding. If round bales are stored in a barn, they have no more storage loss than the same hay put up in square bales. However, many round bales are stored outdoors. Outdoor storage losses occur mainly when rain and melting snow penetrate the top of the bale and water wicks up into the bottom of the bale from the soil. Most losses occur in winter when bales don't dry out between storms, thus allowing water to soak deeper and deeper into the bales. Several other factors influence losses in large round bales stored outdoors:

1. Wet weather: greater storage loss occurs in wet years than in dry years.
2. Hay composition: more loss occurs in legume and mature grass hays having fewer leaves to form a thatch.
3. Length of storage: bales stored for a short time have less loss than those left out all year.

For estimating the value of improving your round bale storage management, use the values in Table 1 to estimate the economic return of alternative storage methods. The values in Table 1 are a summary of four research projects.

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	5-10%	8%
Uncovered on pallet	28-39%	34%
Uncovered on gravel	4-46%	22%
Uncovered on ground	7-61%	33%

These results show that the greatest return from outside storage management came from top covers, not from placing the bales on pallets. Keep in mind that at all locations the bales were stored on well drained soils. In wet years, storing on wet soils for even a few months can result in a 10% to 25% loss from the bottom of a round bale. On wet soils it is worth the investment to make a raised storage area covered with 4 to 6 inches of clean gravel to prevent hay loss from the bottom of bales.

Here is an example of estimating the value of improved hay storage. If you have a herd of 25 cows averaging 1,100 pounds each in weight, and you feed hay at 2% of their body weight (a dry cow's maintenance requirement) for 180 days, you will need about 50 tons of hay dry matter ($\{25 \times 1,100 \times 0.02 \times 180\} / 2000 = 49.5$) or 55 tons of air dry hay ($49.5 / 0.90 = 55$). If this hay is stored in a barn, you will have a 5% storage loss and will need to harvest and store 58 tons of hay during the summer ($55 / \{1 - .05\} = 55 / .95 = 57.9$). If you were to store the bales outdoors on the ground without any covers, you could expect a 33% storage loss. In this case, you would need to harvest and store 82 tons of hay ($55 / \{1 - .33\} = 55 / .67 = 82.1$). This is an additional 24 tons of hay or 24 acres of hay if you are harvesting a typical 1-ton-per-acre-per-cut yield. On average it costs about \$25 per acre to mow, rake, and bale hay. Local costs may be more or less than this so be sure to use them. In this example, storing hay on the ground instead of in a barn amounts to \$600 per year in additional haying cost for the 25 head of cattle.

If we carry this example a little further, we can see that the savings in haying cost for our 25 head of cattle more than offsets the cost of a barn. It takes about 20 square feet of barn to cover 1 ton of 500-pound round bales stacked three high. It costs between \$3.50 and \$7 per square foot of barn depending on materials used and cost of labor and site preparation. For our example, let's say we buy all new materials, hire a bulldozer to level the site and install surface drainage, and do the work ourselves for a cost of \$4 per square foot. If we spread the expenses over 10 years, the barn cost is \$8 per ton ($\{20 \times 4\} / 10 = 8$). The barn cost for 55 tons of hay will be about

\$440/year (55 x \$8=\$440). When the additional haying cost is \$600 per year if the hay is stored outdoors without cover, the net return on building a pole barn would be \$160/year. Depending on the availability of materials, you may be able to build a less expensive barn than the one priced here. In either case you need to study your options based on local costs.

The total cost of storing your hay needs to include a reasonable charge for:

1. Materials required for the barn or for plastic
2. Labor and machinery required for wrapping, hauling, and stacking
3. Labor and machinery to take bales out of storage
4. Cost to dispose of waste plastic
5. Taxes on machinery and buildings

The cost of improved storage is inexpensive compared to the cost of making hay. Building a pole barn for storage is one of the most convenient methods of improving storage conditions but it may be an expensive alternative. When plastic is well managed and used for more than one year, it can result in a lower material cost than barn storage. The increased labor required with plastic covers increases their total cost and may make the barn alternative more attractive. Plastics can provide an inexpensive, flexible storage alternative, but they pose a potential environmental hazard if not managed properly. It is very important to clean up and dispose of the used plastic in an approved manner to keep your farm clean, to prevent waste plastic from blowing onto your neighbor's land, and to keep your cattle safe. Where available, recycling plastic is the preferred method of disposal.

Table 2. Material costs of alternatives for a 1200-pound round bale storage system.

Storage System	Unit Cost	Useful life of Storage System (years)			
		1	2	3	10
Cost/ton dry matter/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			

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