



## Feeding Hay More Efficiently

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Most Mississippi producers might be facing a longer winter hay feeding season if environmental conditions do not improve very soon. The lengthy dry conditions and the loss of forage production due to heavy armyworm infestation over the summer have put producers into an early winter feeding program. Dry conditions have also caused a delay in planting and establishing winter annual crops such as annual ryegrass, small grains and clover mixes. As they approach the time for hay utilization, livestock producers should be asking themselves the following questions: How much hay will be utilized on my farm per cow per day during the feeding season? What is the quality of the hay that I will be feeding this winter? How long will my feeding season be? Do I have a surplus in case weather conditions hinder the grazing efficiency of my winter annual crops?

Now is the time to start thinking about hay supplies for the winter. With early feeding, producers need to examine their hay inventory now to ensure that they have enough hay for their projected hay feeding period. This will allow them to buy hay in advance, saving money and time. When determining if additional hay is needed, producers should take into account how much hay they have in their inventory, how much hay they need to feed every day based on the class of livestock (dry cows, stocker, heifer, yearlings, weaned calves, etc.) and their production stage (breeding, lactating, growth, fattening, etc.).

For example, a 30-cow herd (average weight of 1,000 lbs/cow) with a daily requirement of 2.6% of its body weight will require approximately 35 tons of hay over a 90-day feeding period (approximately 26 lb of hay per cow per day). That translates into roughly 88 large round bales (avg. 800 lb/bale). But when producers project the feed inventory needed for the winter, they may actually estimate their cows' feeding needs at 36-40 lbs. of hay per cow per day. Why? They need to take into account hay losses rather than just the hay consumed by the cows. These losses include hay spoiled

due to improper storage methods, hay that was dropped on the way to feeding, and the hay that is wasted or refused during the feeding process. If we assume that there is a 30% loss in dry matter when hay is stored outside and a 10% loss at feeding time, this means that the operation mentioned before will need 49 tons of hay or 123 large round bales instead of the previously calculated inventory. On the same token, always budget at least an extra 30% more hay in case the feeding season gets extended.

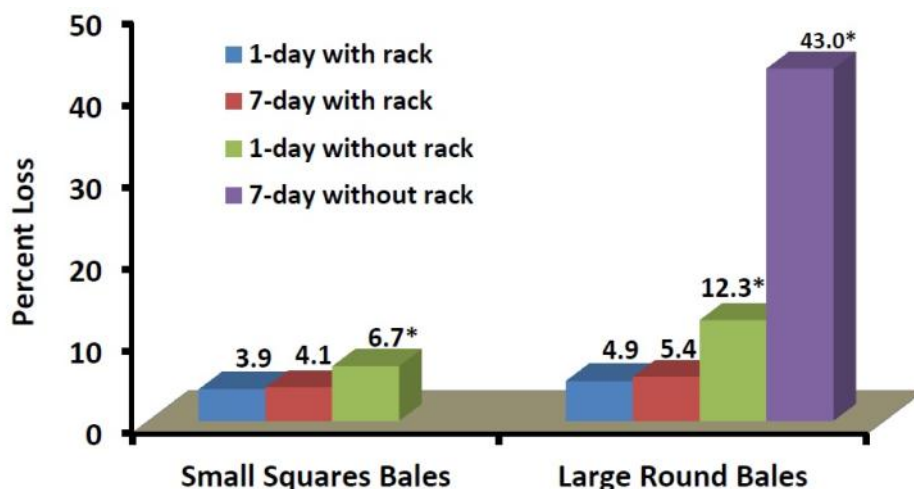


Figure 1. Estimated percent losses of hay offered with different feeding systems. \*Bales were spread or unrolled across pasture. Source: Kollenbach, 2000. Univ. of Missouri.

Hay accounts for the majority of winter feed for cattle and yet nutritional content of hay varies the most among feed commodities. If you are purchasing hay for your operation, keep in mind that quality will vary greatly from farm to farm and even from field to field or cutting to cutting on the same farm. All hay is not created equal. Most livestock producers rely on visual inspection and smelling of hay to determine quality. While visual inspection will give clues as to the overall quality status of hay, it cannot measure nutrient content. To get the most out of their hay and to be more efficient in ad-

justing their rations, producers should get their hay tested. **Publication 2539** at **MSUCares.com** describes the proper way for collecting a hay sample for quality analysis. Knowing the nutrient content of hay allows producers to easily adjust the hay needed and necessary supplementation according to the specific livestock's nutrient requirements. The Mississippi State Chemical Lab and the LSU Southeastern Research Station Forage Quality Lab offer a forage testing program for a very affordable fee.

The Mississippi State University Forage Extension Program has developed a hay calculator (**Publication 2590**) to help producers determine the amount of hay needed for winter feeding and to determine if the crude protein (CP) and total digestible nutrients (TDN) requirements for a livestock class are met. The inputs required for this calculator include hay quality analysis, herd size and average weight, length of feeding period and projected feeding losses. If producers have trouble using the hay calculator to estimate how much hay they need to feed every day, they can get assistance from their County Extension Office. If the calculations show that additional hay is needed or that the nutrient requirements (CP and TDN) need to be adjusted based on the quality of the hay, contact your animal nutritionist to develop the necessary supplementation that will fit into your operation.

Another aspect of improving hay utilization is determining the most proper feeding method. Some producers might be using large round bales while others might be using small square bales. Hay production or purchasing costs are usually constant whether the forage ends up in the animal or on the ground (wasted during the feeding process). Hay losses during feeding can range from 5 to 40%. For a 30-cow herd with a 90-day feeding period, feeding losses of 40% could change the required hay inventory from 35 tons to 47 tons. If the price of hay is \$100/ton, this will be a difference of \$39 per cow per season. This means that if a producer moves from a low efficiency system (40% waste) to a high efficiency system (5%) they would save 846 lb of hay per animal (roughly one bale), or \$14 per head over the course of one feeding season.

Although hay feeding losses can be expected with any feeding approach, the amount of loss can vary depending on the type of bale and the type of feeding structure. Feeding losses include trampling, leaf shatter, chemical and physical deterioration, fecal contamination and refusal. Keep in mind that the major objective of any feeding system is to keep feeding losses to a minimum and to allow the livestock to utilize a greater proportion of the feed being offered. Most feeding losses are usually associated with the feeding method, the amount fed at any time interval, weather conditions and the number of animals being fed. Feeding losses in various research trials have ranged from less than 2% to as high as 60%. Feeding losses of 3-6% are quite common and acceptable for most conservative feeding programs, although the lower losses are usually associated with systems that require high labor inputs and daily feeding.



**Figure 2.** Improper ways of feeding hay.

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A study at Michigan State University indicated that ring and ring/cone type feeders were the most efficient, resulting in an average of only 4.5 percent waste, while trailer type feeders had 11.4 percent wastage. Cradle type feeders were least efficient, with 14.6 percent of hay wasted. Research at The University of Missouri also compared the efficiency of several feeding systems (**Fig. 1**). The study indicated that the least efficient feeding system resulted from feeding free choice large round bales (no feeding structure), in which cows wasted 43% of the hay offered. The study also indicated that unrolling hay in the field did not improve utilization. When a week's ration of hay was unrolled at one time, losses remained in the 40% range. Unrolling just enough hay to last a day cut losses to 12%. In this situation, cows were actively competing for each bite, clustering around the hay as it was unrolled, resulting in a relatively small amount being refused, spoiled, or trampled. This shows that while no feeding system is perfect, the goal of minimizing feed wastage is possible with a workable and cost effective system.

Because cows are notorious for underutilizing hay (**Fig. 2**), pulling bales apart, trampling and bedding in hay), it is important to question how much hay your cows are wasting. Whether feeding daily or weekly, using round bale feeders might help reduce waste. When offering a week's worth of hay at a time, using a feeding structure could reduce hay



waste by 80% (relative to feeder). This means that only 5 to 6% of the total hay supplied is wasted. Daily feeding using a ring type feeder also results in low loss, in the range of 3-5%. When using any type of hay feeding structure, it is important to make sure that there are enough feeders to allow each animal to eat at the same time. Although feeding twice a week or once a week is less labor intensive, it requires a large number of feeders to hold the needed hay supply. When using a hay ring, consider the space available around the feeder. Most hay rings should have enough space for approximately 10 cows at a time. Also keep in mind that more aggressive cows will eat first and will consume the most palatable hay while more timid cows will be forced to eat the low quality hay or go hungry. If you have a 30-cow herd that is consuming 900 lb of hay per day you could use one bale of hay in one ring per day, but it might be more beneficial to have 3 hay rings that are refilled every 3 days. In addition to cutting labor, this gives each cow in the herd a chance to get the hay that it needs and reduce competition.

Remember that no matter how you package your hay (square or large round bales); if you waste it at feeding time, you lose money. Here are some easy tips that help to reduce losses:

1. Always feed hay in small amounts or in a feeder to minimize losses. This reduces opportunity for trampling.
2. Feed hay in well-drained areas. Feeding areas should have a footing such as gravel or concrete to help minimize muddy conditions. Feeding in one area usually results in heavy weed pressure and soil compaction. It might be a good idea to move your feeding area around the pasture to reduce the possibility of muddy conditions and increase nutrient (manure) distribution to improve soil fertility in bare or thin spots. Regardless of the approach used, when feeding hay in pastures, any areas where the existing sod was killed should be reseeded as soon after the feeding season as possible.
3. Feed poor quality hay first. Hay that has been improperly stored outside usually has high dry matter losses and lower palatability. If you start feeding high quality hay early in the season, animals often refuse the poor quality hay when it is fed later.

**Does my type of bale affect feeding losses?** Large round bales were designed to minimize labor, but not waste. Large round bales that are stored outside can increase losses due to spoilage. Although feeding round bales does not require the use of any feeding equipment, having free access to hay makes this system more prone to higher feeding losses. Feeding hay in a rack or ring becomes crucial for producers who do not or cannot feed on a daily basis. The system requires an initial investment (hay rings cost about \$125 each), but feeding losses are low (even with a 7-day supply), which means saving money by saving hay. On the other hand, square bales are more labor intensive, but could reduce hay losses if fed properly. They should be fed in bunks or racks when possible to minimize trampling.

Producers should keep in mind that when changing the type of hay being fed, changes should be made gradually. This is usually critical when changing from a grass to a legume based diet. The microbial population and the environment in the rumen must have time to adjust to the different type of feed. Sudden diet changes can make the animal sick or cause bloating. It might be a good idea to start by mixing two hay types for a week and adding more of the new hay with each subsequent feeding.

In summary, many Mississippi farms have hay feeding losses that are as high as storage losses. Feeding losses can be expected with any feeding system, but the percent of loss can vary with the system used. The objective of using a feeding system should be to minimize losses to a practical and economical level by optimizing the animals' utilization of the hay being offered. The amount and the cost of hay feeding losses will be determined by the feeding method, the interval between feeding (days vs. weeks), amount of hay fed at a time, weather conditions, the number of animals and their nutrient requirement, and the quality of the forage being fed. Remember that no feeding system is perfect, but the goal is to minimize feeding losses within a workable and cost effective system.

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