Managing Hay Waste in Beef Cattle Wintering Systems

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Hay waste is often over-looked as an economic leverage point in beef cow wintering systems. In a well-managed wintering system, at least 15% of roughage is wasted through harvest, storage, and/or feeding losses. In a 100 cow herd, this equates to wasting about $4,000. Typically, losses approach 35%, resulting in $9,000 of wasted roughage. Even in this time of record profitability in the cow-calf sector, giving away $40-$90 per cow is a management issue that needs to be addressed.

The three primary components of hay wastage are harvest losses, storage losses, and feeding losses. Although harvest losses are a critical component of the inefficiency equation, this article is going to focus on storage and feeding losses.

Storage Losses

Storage losses are the portion of the hay crop lost during the storage phase of the cycle. Losses range between less than 10% to nearly 40% in many situations. Crop losses are incurred primarily from exposure to the elements while the crop is setting in inventory before use. In beef systems, the most common form of hay harvest is round bales. Moisture seeping into the outer 1-6" of the bale and causing extensive heating or rot is the main culprit of loss as the affected area can represent as much as 25% of the weight of the bale. Loss incurred during storage in inventory is principally dependent on storage method and time exposed to the elements.

Storing a hay crop under a cover, whether a building or tarp such as in Figure 1, will generally result in the least amount of storage loss. In an unpublished research project conducted in eastern South Dakota, different methods of outside storage and stacking methods were analyzed to determine the amount of loss associated with each method. Research showed hay stored under a tarp resulted in less than 10% loss. Although tarping outside hay is becoming more practical and economically feasible, the vast majority of hay stored outside in beef systems remains uncovered.

Stacking method has been shown to have a substantial effect on storage loss for hay stored outside. The effectiveness of reducing storage losses relies on how effectively the shape of the stack can repel and remove water away from the hay stored in the stack.

The pyramid stack as shown in Figure 2 was shown to be the most effective method of stacking hay uncovered with less than 15% loss. It is the most effective at repelling and removing both snow and rain. Trapezoid-shaped stacking as shown in Figure 3 resulted in 30-40% storage loss. It fails to allow moisture to exit the stack properly and permits moisture to soak into the bales where it gets trapped as a result of the shape of the stack. Storing round hay bales in rows as shown in Figure 4 was shown to be an effective method; however, it consistently resulted in higher losses than other methods because every bale touches the ground. The distance between the rows of bales was shown to have an impact on storage loss due to level of snow capture. Rows that were less than 3' apart had storage losses of 30% or more; presumably the higher level of snow capture resulted in melt water not having an escape point and an undetermined amount soaked into the bales resulting in significant spoilage in the outer 6" of the bale. This, in combination with the spoilage at the bottom of the bale where it was in contact with the ground, contributed to the high storage loss.

Feeding Losses

Feeding losses are the proportion of the hay crop that is lost at the time of feeding. Feeding method has been shown to have a significant impact on the amount of hay that gets wasted. The two primary methods of feeding hay are categorized as processed and ad-libitum feeding. In a South Dakota study, two methods of bale processing were investigated to determine the amount of wastage when fed on the ground to mature cows. The processing methods researched were tub-ground to approximately 1" and fed through a delivery wagon, and processed using a Vermeer™ bale processor. Total losses, including processing losses and feeding losses, were 9% and 11% respectively.

Feeding losses between processed hay and ad-libitum fed have not been directly compared, however, recent research conducted in Oklahoma evaluated feeding losses from four common ad-libitum feeding methods: modified cone feeder (Figure 5), open bottom steel ring (Figure 6), polyethylene pipe ring (Figure 7), and steel sheeted-bottom ring (Figure 8). Modified cone feeders had the lowest amount of feeding losses with 5%. Steel sheeted-bottom feeders resulted in 13% feeding losses. The polyethylene ring feeder and the open bottom steel ring feeder had the highest feeding losses at 20%.

Figures. 1. Hay stored under a tarp result in <10% loss, 2. Hay stacked in a pyramid shape can reduce storage loss to <15% 3. Hay stacked in a trapezoid shape can result in >25% storage loss, 4. Spacing between rows of bales has a significant impact on storage losses, 5. Modified cone feeder, 6. Steel open-bottom feeder, 7.Polyethylene pipe ring feeder, 8. Steel sheeted-bottom feeder *(photo credits italicized)*.

Summary

Storage and feeding methods contribute substantially to the amount of hay losses incurred in beef cow wintering systems. Although different methods of stacking uncovered hay outside are available, of the methods evaluated here, stacking round bales in a pyramid fashion results in the least amount of storage losses. Processing hay will minimize feeding losses, however, equipment needed to process and deliver are substantial. Ad-libitum feeding hay generally results in higher feeding losses, but with less equipment. Additionally, ad-libitum feeding in modified cone feeders resulted in feeding losses comparable with processed feeding systems, although equipment needs, such as a loader tractor, are higher than with other feeder systems.