IOWA BEEF CENTER

MAKING THE SWITCH TO BALEAGE

Making hay in the Midwest can present multiple challenges. Baling wet or rained-on hay and using outdoor hay storage can contribute to reduced forage and feeding quality. Feed costs in the cow-calf sector are often greater than 50% of total production costs, with the largest proportion of that feed cost derived from forage expenditures. Adopting new schemes of forage harvest practices that may increase forage quality, reduce dry matter (DM) losses, and reduce feed wastage are essential to minimizing wintering feed costs and enhancing profitability in a volatile cattle market.

Considerations for Feeding Baleage

In the Midwest, weather is the primary factor that influences quality of dry hay. In many instances, wet spring weather often delays first cutting, resulting in mature hay with decreased quality, palatability, and digestibility. If cutting is not delayed, often the window of opportunity for optimal drying is reduced, producing hay that is either baled too wet or has been rained on, again resulting in reduced quality at the time of feeding. Furthermore, the heating of wet hay not stored as baleage represents an energy loss that could be used by animals. Reduced hay quality and palatability may be further compounded by poor bale storage practices which often lead to increased waste during feed out. One managerial alternative to reduce waste is grinding hay and feeding it as part of a total mixed ration (TMR). However, the equipment needed for a TMR system, including a feeding apron, fence line bunks, and mixer wagon, may be more costly than a small- to medium-sized beef producer can justify in the short term.

Producers who feed dry, large, round bales may want to consider using baleage as a harvest system. This move could reduce the amount of DM loss during storage and limit waste at feeding, while at the same time being less costly than converting to a TMR feeding system.

IBCR 202 February 2016

IOWA STATE UNIVERSITY
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Integration of baleage into a feeding system also can partially alleviate other disadvantages of first-cutting dry hay such as reduced nutritional quality, dry matter loss, and waste. In addition, employment of a custom harvesting and wrapping firm would still allow for use of existing infrastructure without the necessity of upgrading equipment.

Advantages of Baleage

As with any management system, the pros and cons of moving to baleage should be considered prior to implementation. Due to the moisture content desired for proper baleage production (40%-50% DM), the time needed for forage to cure is drastically reduced when compared to production of dry hay, thus reducing the impacts of weather on harvest. Baleage often can be made within 24 hours of mowing. This is an added advantage when trying to harvest annual forages that typically do not dry quickly enough to make conventional hay. Examples like wide leafed, succulent summer annuals such as sudangrass and early spring cover crops such as rye are difficult to dry properly. Although not optimal, it is possible for baleage to be made at any moisture down to 25%. Thus, if dry hay is the goal and rain is threatening, baleage is an alternative. Just keep in mind that bale moisture outside of 50%-65% does pose potential fermentation problems that could alter fed product quality.

Reduced dependency on dry weather for making baleage lends itself to earlier and more frequent cuttings of vegetative growth, increasing the overall quality of stored forages for the year. Compared to dry hay from the same field, baleage production reduces DM and leaf loss during harvest, providing for increased protein and total digestible nutrients (TDN). Researchers at the University of Florida reported baleage improved crude protein and total digestible nutrients on a DM basis when compared to dry hay from the same field.

Baleage typically results in DM storage losses of only 5%-10%. This is significant when compared to harvesting and storage losses of dry hay stored outside with no cover, which could have loss as high as 30%. Also, deterioration and weather exposure of large dry round bales stored outside can result in 25% or more waste at the feeder. Due to advantages of baleage, waste is often 10% or less when an appropriate feeder is used.

Disadvantages of Baleage

Many of the drawbacks associated with baleage involve elevated moisture content. Higher moisture means bales are considerably heavier and can impact the size of bale existing machinery may be able to handle. In many operations, bales designated for baleage need to be up to 12 inches smaller in diameter when made with a conventional baler. Newer baler models specially designed for baleage are constructed to help handle the increase in bale weight, but may make heavier bales than some smaller farms can move with existing loader equipment. Regardless of baler type used, the increased moisture of baleage will result in more total bales made from a particular field compared to dry hay. Ultimately, this will increase the size of storage area needed and may impact which wrapping is the better choice for an individual operation.

Smaller bales consisting of less dry matter also increase the frequency in which bales must be delivered to cows to meet their dietary requirements. Although feeder space could be added to reduce delivery frequency, baleage will begin to spoil once exposed to air. It is advised that baleage be consumed within 48-72 hours of air exposure. Depending on the age of equipment used, the moisture and density of baleage may limit the producer's ability to effectively grind the product and incorporate this feedstuff into a TMR. If a TMR ration is the goal and older equipment is being used, haylage may be a better option.

However, newer TMR mixers may have the capability of easily incorporating baleage, particularly if a precutter is used during the baling process to keep hay length at 4 inches or less. Other considerations associated with baleage include cost, transportation, labor, and plastic disposal.

Baleage is more labor intensive than dry hay production during the wrapping process as the forage must be baled, transported to the storage site, and wrapped within 12 hours. This is different from dry hay production where bales may not be transported to the storage and/or feeding site until days or weeks after baling. Plastic wrap increases the cost per bale compared to dry hay (but is comparable to using a preservative on wet hay) and can be both costly to dispose of and cumbersome. Once wrapped, in-line bales cannot be transported, so the bale line needs to be located close to the future feeding site. If producers are using an individual wrapper in anticipation of moving bales before opening, a "hugger" loader attachment will need to be used to prevent plastic puncture. Added water content likely limits the markets where any potential excess baleage might be sold and economically transported.

Best Management Practices for Producing Baleage

1. **Moisture**: Bales should be 50%-60% moisture (or 40%-50% DM). Although drying time will vary based on forage yield, most baleage can be made within 24 hours after cutting. Just as with silage, a product that is too wet or too dry can cause fermentation problems resulting in heat damage, mold production, storage losses, listeria, etc.
2. **Quality:** Plant sugar is a requirement for ensiling, so utilizing good quality standing forage is imperative. Forage that has been rained on after cutting and overly mature standing forage that has reduced plant sugar will not optimize the ensiling process.
3. **Time:** Bales should be wrapped no more than 12 hours after baling. Much like silage, allow at least 30 days for baleage to fully ensile. For optimal quality, feed baleage within nine months.
4. **Size:** Larger bales result in less total plastic needed to store the entire crop. However, given their moisture content, bales can quickly become larger than equipment on many beef operations can handle. For most producers, bales should weigh less than 2,500 pounds, which may mean making smaller diameter bales. Large square bales also may be an option, but keep in mind these bales have more surface area per volume of forage, and thus use more total plastic.
5. **Baler:** Be sure the baler is capable of making an extremely tight (dense) bale. Oxygen is the enemy when it comes to ensiling and a bale that is too "loose" can lead to mold as well as other problems. Thus, the denser the bale, the better. Having a baler with a precutter capable of chopping the forage (i.e. "silage special" package) to reduce particle size will help considerably when working with taller, more mature forages. Another consideration is a high moisture kit with scrapers and cleaners to avoid buildup in the bale chamber. Bales should be made "square-shouldered" to make more uniform tubes of bales. Net wrap should be used to pull stems down and reduce puncture risk of plastic.
6. **In-line vs. individual bale wrapping:** Which is better for your operation? In-line will use as much as 40% less total plastic and thus be more economical purely from a wrapping perspective. Also, many in-line wrappers can wrap up to 50 bales per hour, where individual-style bale wrapping equipment may be limited to 25 bales per hour. However, individually wrapped bales usually contain less air and are better suited for transport. Also, individually wrapped bales may be a better option for smaller operations that do not feed as regularly by reducing spoilage that would otherwise occur at the exposed end of in-line wrapped baleage.
7. **Attention to plastic:** Bales should be wrapped with at least 6 mm of plastic (8 mm is better) to avoid air contamination and mold. Also, monitor plastic for damage and seal with tape specifically designed for ensiling as needed. Pests, hail, equipment, and people all can cause damage to the plastic.
8. **Rate of use:** Consider the number of animals being fed. Make a forage budget. Excess baleage should not be held over into the following feeding season.

Baleage vs. Haylage

Questions often arise as to which forage form is more appropriate for an individual operation. If the final product will be close to a feeding area that can properly handle loose forage, bagged or bunkered haylage may be a cheaper, more viable option. Overly mature forages or spring cover crops with increased stem length and circumference may be better suited for haylage because chopping will reduce particle size and allow for tighter packing in the bag or bunker. Also, depending on the feeding equipment used, haylage may more easily be

incorporated into a TMR, and thus the delivery amount can be adjusted on a daily basis. On the other hand, baleage may be the better option if ring, cone, cradle, or trailer feeders are the preferred delivery system, and/or if forage must be moved a considerable distance to be fed. Also, individually wrapped baleage provides an avenue for selling excess ensiled forage.

Utilization in Cow-Calf Diets

Due to slightly increased nutritional value and decreased waste at the feeder, baleage may be a cost-effective forage alternative to dry hay in cow diets. Table 1 depicts three hay- or baleage-based wintering rations for beef cows in mid-January in the Midwest.

Table 1. Comparison of example beef cow wintering rations using dry hay or baleage[1]

Item	Hay in ring, pounds as-fed[2]	Hay-based TMR, pounds as-fed[3]	Baleage in ring, pounds as-fed[4]
1st cutting grass hay	39	25	---
1st cutting baleage	---	---	58
Cracked corn	2	---	1
Modified wet distillers grains	---	7	---
Mineral	0.2	0.2	0.2
Cost/hd/d	$1.80	$1.32	$1.47

[1] Assumes 1,350 pound cow, BCS 5, 3rd trimester, maintenance diet. On as-fed basis hay cost is assumed at $80/ton, corn at $4.00/bushel, MWDGS at $60/ton, baleage at $45/ton (includes wrapping), and mineral at $1000/ton. Does not take into consideration storage losses.

[2] Assumes 25% waste as result of outside storage and feeding in ring, hay at 85% DM.

[3] Assumes 5% waste, limit-fed ration, MWDGS: 60% DM.

[4] Assumes 10% waste of baleage, baleage at (or of) 50% DM.

The example rations indicate that the non-limit-fed baleage ration is considerably less costly than non-limit-fed hay in bale rings when potential waste at the feeder is taken into consideration. However, non-limit-fed baleage is more costly than a limit-fed TMR consisting of ground hay and modified wet distillers grains. It should be noted that these rations do not take into consideration storage loss of dry hay or additional costs of equipment or infrastructure needed for feeding a TMR including baleage. Such costs of baleage production are variable depending on type of wrapper (tube or individual) and/or cost of custom harvest and wrapping.

Summary

Baleage production results in less DM loss during storage, increased forage quality when compared with dry hay of similar maturity, and typically results in considerably less waste at the feeder. Thus, when accounting for potential equipment and infrastructure needs for TMR, baleage-based beef cow diets may be a viable alternative to ring-fed dry hay diets, and may be economically comparable to limit-fed TMR hay diets. However, costs and logistics associated with baleage production should be considered to determine true economic viability. Ultimately, the best program for any given farm will be individualized and depend on local opportunities.

References

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Cover photo by Dan Loy, professor of animal science and page 2 photo by Patrick Gunn, assistant professor of animal science, Iowa State University Extension and Outreach.

Expert Reviewed

This publication was peer-reviewed by two independent reviewers using a double-blind process.