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Advantages of Baleage as a Forage Source for Ruminant Animals

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The popularity of making high moisture forage into baleage continues to grow. Baleage is typically made by baling long stemmed hay into large round bales while in a moisture range of 40 – 70% moisture and enclosing it in plastic to exclude oxygen leading to fermentation and a stable stored product that cattle and other ruminants prefer.

For the last 50 years dairy farms have made fermented chopped hay and stored it in silos and bunkers as haylage. Harvesting and storing haylage is one of the most efficient ways to store large volumes of wet forage in a very timely manner that maintains its quality and mixes well with other feed in a ration when it is ready to be fed. Still some dairies do like the ability to make smaller quantities of long stemmed annual forages like oatlage, sudex, or hay into baleage. Over a more recent time period many beef and other livestock farms have discovered the many advantages of baleage for their operations. Most recently the grass-fed beef movement has found the great advantage of producing higher quality winter feed that grass-fed cattle require by feeding baleage.

Specifically these farmers are switching to and liking baleage because: 1.) it takes less drying time to get wet hay to the proper stage of moisture than it does dry hay – usually 24 – 48 hours less making harvest season easier; 2.) the feed quality of baleage is higher than the same comparable dry hay because more forage leaves are retained and harvested in the process of making baleage than dry hay; 3.) the lower feed storage loss of baleage that is wrapped in plastic and fermented vs. the storage of dry hay stored outside un-covered; and 4.) the lower feed loss and refusal by animals when feeding baleage vs. feeding dry hay.

Complete economic analysis studies looking at the advantages of baleage are complex and costly. However various studies on portions of the baleage system advantages over dry hay have been completed as well as other studies on forages that can be applied to the baleage analysis. Below are a few of these studies.

Timely Alfalfa Harvest – In a study done by Martin and others in the States of Idaho, Pennsylvania and Wisconsin in 2004 and 2005 alfalfa yield and quality change were measured over the course of the growing season for 1st, 2nd and 3rd cuttings beginning at the optimum maturity stage for each cutting and then sequentially every five days beyond that up to 20 days past the optimum stage. Researchers found yields increased 120 – 180 lbs. of dry matter per acre per day depending upon the location and the cutting. But more importantly for dairy and grass-fed beef farms needing high quality forage the study found the forage quality decreased based on Relative Feed Quality (RFQ) a range from 3.7 to 4.6 units per day over the 20 day period, or an average drop of 4.2 units per day. The simplest method to put value on this research data is to look at the current year's hay market. In 2017 prime alfalfa hay is averaging $160 per ton for 150 RFQ hay or $1.06 per unit of RFQ for 16% moisture hay. This would be $1.26 per unit of RFQ when converted to 100% dry matter hay like the forage mentioned in this study. If we can assume the process of making baleage allows a farm to complete each cuttings harvest in ten days versus a dry hay system with weather delays taking 20 days past optimum, the following financial projection can be offered based on the research trial. Baleage's average forage harvest would be 5 days beyond optimum (1/2 of a ten day harvest) and dry hay would be 10 days beyond optimum (1/2 of a 20 day harvest). For baleage the average quality loss would be 5 days x 4.2 RFQ units x $1.26 = $26.46 per ton of dry matter. For dry hay it would be 10 days x 4.2 RFQ x $1.26 = $52.92 per ton of dry matter. Thus if baleage on average allows a farm to complete baled forage harvest 10 days earlier per cutting than the harvest of dry hay, then baleage would have an advantage in feed quality based on harvest maturity alone of $26.46 for every ton of dry matter forage harvested.

Overall Economics of Baleage A financial analysis of baleage economics was published by Louisiana State University's Ag Center for Research & Extension in 2013 entitled "Economics of Baleage for Beef Cattle Operations". Though the climatic conditions and forages grown in Louisiana are vastly different from Michigan a lot of the assumptions in the analysis like feeding beef cows for 150 days in the winter are similar enough for the document to provide some credence to Michigan producers.

The LSU Economists estimated the dry matter forage loss of a baleage system was 5% while that of a dry round baled hay system was conservatively 25% when the harvest loss of mowing, raking, baling and hauling was added to the storage loss of outside storage.

Then they estimated the operational costs and in-direct costs for each system per ton of forage as fed to be $8.63 for dry hay baling; $10.04 for baleage in an in-line wrapper; and $13.81 for individually wrapped bales. In the end when they compared in-line wrapping baleage systems and individual bale wrapped systems to dry hay round bale systems estimating the forage savings and the operational costs the in-line system had a net saving advantage of $46.96 per cow per year, and the individual wrapped bale system had a $34.89 savings per cow over dry round baled hay each year. To pay for the additional purchase cost of the silage version of a round baler (assuming an eight year useful life) and the wrapper (assuming a 15 year useful life) they estimated that it would take a beef herd with 173 cows to justify an in-line wrapper ($8,140 annual loan payment divided by $46.96 of saving per cow per year) and 183 cows for the individual wrapper ($6,395 divided by $34.89). Given Michigan's longer and much colder winter's that would increase feed consumption above Louisiana's 24 lbs. of dry matter hay per day for the 1,200 pound cow, one can assume that these cow herd numbers would be slightly lower to justify the purchases for Michigan herds since more hay would be consumed.

But that estimate is only factoring in harvest loss and storage loss and not the feed quality advantage of baleage of $26.46 per ton of dry matter that was estimated from the more timely harvest. Factor that in and the LSU Economists project that some herds with as few as 75 cows could possibly cash flow wrappers. Those with 150 cows or more are highly likely to see a significant financial advantage to baleage. Even a herd at 80 cows should not give up on the idea of baleage. Ownership may not be practical but renting a wrapper may be financially justified and more and more wrappers are being offered for rent across the State. The rental fee and timing of availability of the wrapper may be the key factors of making that decision.

Baleage has its share of advantages for some dairy and many commercial beef operations. Projecting a financial analysis is complex and must really be done by an individual farm before they determine whether a baleage system is right for them.

Pruitt, Ross J.; and Lacy, Curt R. 2013. Economics of Baleage for Beef Cattle Operations. Louisiana State University Ag Center for Research & Extension publication # 3330.

Martin, Neal P.; Brink, Geoffrey E.; Hall, Marvin H.; Shewmaker, Glenn E.; and Undersander, Dan J. 2005. Rate of Yield and Quality Change in Alfalfa, http://alfalfa.ucdavis.edu/+symposium/proceedings/2006/06-223.pdf