

This article was presented on June 18, 1997
at the Purdue Hay Day.

Can Balage Benefit Your System?

Dave Forgey
Dairy Producer
Logansport, IN

The development of several new resilient plastic films in the past few years has brought many new methods for the storage of forage crops. No longer is plastic just a cover, now it can be air and vapor sealed.

What are the most common systems in use?

The first systems in use were bags sized to place a bale inside. These were expensive and cumbersome because they required sliding a bag on each bale and then sealing the end.

- The advantages for a small operator were no need for additional equipment.
- Small amounts could be processed and fed at a time.
- A disadvantage can be sizing bales to fit bags. If holes are punched in the plastic then air can move freely around the bale and spoilage can occur.

One of the least expensive systems is called a Hay Wrap machine. It involves spearing a bale with a long rod and spinning the bale hydraulically while plastic film is stretched on the outer circumference of the bale. Bales are then stored tightly end to end.

- The advantages are low equipment cost and a low investment in plastic per bale.
- Some disadvantages can be air getting into the end of bales if they are not packed tightly together.
- Other disadvantages are problems spearing bales in or near the center so they rotate properly and getting wet bales off the spear after wrapping.

Next are the individual bale wrappers which completely wrap a bale on all sides. Some machines pick the bale up from the ground, place them on a table where they spin and roll to allow them to be completely wrapped with plastic stretch film.

- The advantages are moderate investment in equipment and plastic and an excellent air tight seal.
- Bales are sealed individually so if damage occurs to the plastic seal only the individual bale is lost.
- Some disadvantages are bales should not be handled after wrapping until they are ready to be fed to avoid damaging the plastic seal.

A recent development has been called a tubeolator where bales are set end to end in a long row. Then a machine holding a long folded bag is driven down the row lifting the bales up and sliding them into the tube as it unfolds off the back of the machine. Then it returns them to the ground in a neat row. Similar machines allow a bale to be front loaded into a chamber and the machine hydraulically forces the bale into the tube and advances for the next bale.

- The advantages are low to moderate equipment cost and the speed in which they are processed.
- Some disadvantages can be sizing bales properly for the bag and the expense and availability of bags. If a bag gets a hole the air can move around all bales in the bag.

One of the most recent developments has been a machine which allows bales to be stored in long rows but which uses stretch wrapping much like the individual bale wrappers. This machine allows bales to be placed on a platform and then the plastic is wrapped around the exterior of the bales, sliding the wrapped bales down a ramp in the rear in "sausage" fashion.

- The advantages are low cost of plastic per bale, rapid processing, a wide range of bale sizes can be processed, although uniformity is beneficial in wrapping.
- If a hole forms in the plastic it only damages the bale near the hole as the plastic is stretched tightly around the bales.
- The disadvantages are the somewhat higher cost of equipment, and the fact that the ends of the sausage tube are open and spoilage can occur.

Now that we have looked at some of the storage systems, what are the advantages of balage.

Harvesting silage as a long stem product has been proven to be beneficial to ruminant livestock. Long-fiber forages cause more chewing action which produces more saliva. The increased salivation increases bacterial action in the rumen for better digestion.

Balage can be simply fed in rings or unrolled in feed areas in lots or fields. In all instances less machinery is involved than would be required for other forms of stored silage.

One of the main advantages is the flexibility of harvesting. Balage is handled in the same manner as it would be for dry hay. A decision can be made for dry hay or balage based on the weather at the time the hay is in the windrow. Care does need to be taken once hay dries below 30% moisture. At that point there is not sufficient moisture to properly ferment the balage after it is stored. This can cause loss in storage due to inadequate fermentation. There is usually less loss of dry matter when forage is stored at a higher moisture content because the feed is not as easily lost due to shattering of leaves.

Another important benefit is the need for only one type of harvesting equipment. In most conditions a round baler which is used for dry hay can also be used for balage. In fact many wrapping machines are adaptable to wrapping large square bales which are becoming more popular.

In many operations it can allow for silage harvest without the need to fill large structures in a short period to prevent spoilage. This can reduce the amount of machinery needed as well as the amount of labor needed in a short period of time. It can also minimize the delays which are caused by weather conditions.

Some disadvantages are found. Balage does not adapt well to TMR (Total Mixed Ration) systems of feed management. Chopping after fermentation can be difficult and expensive. Most mixer wagons will not shred these large package systems. Due to varying weights and moistures of individual bales it is difficult to adjust rations.

Disposal of plastic from stored balage can be time consuming and costly. Adequate recycling has not been developed at this time.

Attention must be given to maintaining the package without air getting into the stored feed. It is difficult to move bales after wrapping without damaging the plastic covering.

Sisal twine should not be used. The treatment to prevent twine breakdown and rodent damage will deteriorate plastic in a short period of time. Bales are best used within one year of harvest as sunlight will deteriorate the stored forage due to frequent temperature changes. Some bag and tube systems use both black and white plastic, white to reflect sunlight and black to resist ultraviolet rays. Stretch systems don't use both colors of film.

I have done a cost comparison of the different types of balage systems. The source of my information is farmers who use each particular type of system. I am assuming that a farm would have a rear bale fork or front loader with spear for handling bales. I have not included time necessary to transport bales to the wrapping site.

Each system should be judged on it's cost based on the volume of forage to be harvested. Due to the relative mobility of the wrapper machinery they are very applicable to being owned by several farmers or used as rental equipment in local areas.

As a dairy farmer, I have used balage as a major feed source for the last four years. It has proven to be a very good source of high quality feed for our dairy herd. We have used balage as the only feed supply for several months with yearling heifers and dry cows. Our only real concern has been harvesting at the proper moisture to promote proper fermentation. If moisture content is above 60%, excess moisture in the bale after wrapping can cause spoilage due to bytrac acid-type fermentation. Harvesting at moisture contents below 30% can

cause lack of moisture for adequate fermentation. In both cases molds can develop in the bales and cause a health risk to animals who eat the feed. In most cases this is very evident when the bale is opened. If heating or mold is found the bale should be discarded. Many companies suggest the use of preservatives when processing balage. I have not found that they improve the fermentation process if feed is not harvested properly. If it is harvested properly then preservatives are not needed.

Because our animals are always fed in pasture fields in the winter, we have used a bale unroller to feed many of our bales. This system allows us to unroll a bale in a windrow and then place an electrified poly-wire down the center of the windrow. The cows eat under the wire without stepping on the feed. The next feeding the windrow is placed on clean ground about six feet ahead of the previous feeding. The wire is advanced to the new windrow and the cows are eating in a clean area. We like this system because of the way the nutrients are spread across the entire field and not just around bale rings.

This system has gained us many days of harvest when weather conditions didn't allow for dry down of hay. It also allows for more hours of harvest time in a day. With proper planning balage can be harvested in the morning hours, and then dry hay later when conditions permit.

We have found that balage adds many advantages to our forage system.

	Bag	Hay Wrap	Bale Wrapper	Tubeolator	Sausage Wrapper
Purchase price	\$ 0	\$ 2400	\$ 7,000-14,000	\$5000-8000	\$120,000-140,000
Plastic cost per bale	\$ 7.50	\$ 1.50	\$ 2.25	\$ 3.50-4.00	\$ 1.00-1.25
Bales wrapped per hour	15	20	20	40	40