Bagging Silage: A Permanent Solution

It's becoming clear that the expansion craze in today's dairy industry isn't a passing fad. Tomorrow's working dairies will be big and getting bigger. That expansion, combined with the need to wring every efficiency from the production process, has left many dairies squeezed when it comes to economical feed storage options.

Already, most dairies considered only "moderate" in size find it's simply impossible to build enough vertical storage. Horizontal concrete—the next common option—has its share of problems, particularly spoilage losses that can typically run as high as 30 percent.

Balancing low cost with high-quality production has led many expansion projects toward a new option: permanently storing chopped silage and wet feed in long, horizontal, oxygen-deficient tubes until feedout. Bagging silage has been shown, through over 20 years of research, to be capable of reducing costs and increasing profit over either bunker or tower silage systems. Although it does require its own form of management—as does any storage system—a sealed-bag system significantly reduces spoilage losses, improves the quality of feed, contributes to cow productivity and health through better-quality feed, and increases the flexibility of an expanding dairy's storage and feeding options. Look inside this special four-page insert for details on how this new permanent storage solution can contribute to economical feeding.

Comparing all the costs, bags prove the most economical

Bagging is often incorrectly considered to carry a high annual operating cost. However, if you consider all ownership costs—not just interest and principal on the capital outlay, but also labor, maintenance, repairs, fuel, plastic, and property tax—plus the value of spoilage—bags beat other storage in cost effectiveness, University of Wisconsin research shows.

<table>
<thead>
<tr>
<th>Initial capital investment</th>
<th>Annual storage costs</th>
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<tbody>
<tr>
<td>Concrete Stave Silo</td>
<td>$395,065</td>
</tr>
<tr>
<td>Concrete Bunker Silo</td>
<td>$233,175</td>
</tr>
<tr>
<td>Bagged Silage</td>
<td>$81,635</td>
</tr>
<tr>
<td>Concrete Stave Silo</td>
<td>$105,598</td>
</tr>
<tr>
<td>Concrete Bunker Silo</td>
<td>$99,636</td>
</tr>
<tr>
<td>Bagged Silage</td>
<td>$82,040</td>
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</tbody>
</table>

Model is for a 428-cow herd, based upon 7.0 tons DM forage per adult cow and replacement per year, 65 percent moisture. Capital cost includes stone pad for bags, tractor used to pack bunkers 10 percent of total time, header used to unload silage 20 percent of time. Sources: Holmes (1899); Holmes (1924).

Run your own analysis

Want a better idea of how the different forage and silage storage systems will pay using your own numbers? Download DAFOSYM, a forage production, storage, and use simulation model, free from the U.S. Dairy Forage Research Center at University of Wisconsin: http://www.dfrc.wisc.edu/. Or, ask your AG BAG® dealer to conduct a customized Ag-Bag Advantage® Farm Plan analysis on your operation.
Expand Efficiency Using a Bagged Silage System

Experience with using sealed-bag feed storage for larger dairies typically runs like this: Expansion plans lead to a search for low-cost alternatives to preserve or improve the quality of the growing tonnage of feedstuffs demanded. Plastic bags look less expensive than pouring concrete, particularly if you can custom hire or lease the machinery to use on overflow storage. Over time, you find you've moved into almost complete use of bags, discovering they're less expensive in the long run when you consider not only the lower capital expense, but the following benefits as well:

**Better herd nutrition.** Because even the largest diameter bags, at 12 feet, present a feedout face that's three to seven times smaller than other storage, less surface area is exposed to heat and spoilage at each feeding.

![Diagram of typical feedout face](Image)

**Hence, feed removed from properly managed bags maintains a higher quality. It smells better and feeds better.** Expanding dairies that reach the economic threshold to justify investing in truck scales suddenly find that the predicted 10 percent to 12 percent spoilage loss in even well-managed bunkers is not unusual, says dairy nutritionist James DeMatteo.

"I've talked to dairymen who've said that once they've had scales installed, they have discovered shrink exceeding 20 percent... That equates to a $5,000 expense per 1,000 tons," says DeMatteo. In comparison, well-managed bagged silage only has an average loss of 2 percent to 3 percent.

**Expected spoilage losses**

![Graph of expected spoilage losses](Image)

**Better herd health.** The longer chop length—up to 1.5-inch—allowed by a bagging system encourages better DMI consumption and a more hardy fiber mat in the rumen, even when using a totally ensiled ration. That leads to less metabolic disorders during the critical transition period in high-producing cows.

**Ideal chop length**

<table>
<thead>
<tr>
<th>Concrete Stave Silo</th>
<th>Concrete Bunker Silo</th>
<th>Bagged Silage</th>
</tr>
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<tbody>
<tr>
<td>.25&quot; to .5&quot;</td>
<td>.125&quot; to .5&quot;</td>
<td>.5&quot; to 1.5&quot;</td>
</tr>
</tbody>
</table>

**Higher production.** Better quality feed directly translates to higher milk production in intensively managed dairies. By reducing the amount of spoilage, both during fermentation and during daily feedout, a bag-based system increases dry-matter intake as well as feed efficiency. That equates to more milk per pound of feed fed.

**Annual milk production per cow**

<table>
<thead>
<tr>
<th>Concrete Stave Silo</th>
<th>Concrete Bunker Silo</th>
<th>Bagged Silage</th>
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<tbody>
<tr>
<td>21,000</td>
<td>19,750</td>
<td>21,250</td>
</tr>
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Dairies that underestimate the nutritional level of stored silage because of spoilage losses that aren't calculated into the ration may short-change TMRs and reduce production: a 0.10 pound shortfall in protein provided has been estimated to cost 1 pound of milk. A 1-pound shortage of energy in the ration can cost up to 3 pounds in lost milk production per cow per day.

**Speed of harvest.** Estimates say over 80 percent of herds with more than 100 cows that use a bagging system use it in part to produce haylage. There's good reason: Producers who might normally overlook storage losses in silage are traditionally sensitized to the losses that result when a bumper crop of newly conditioned alfalfa gets rained on for several days.
By reducing the harvest period to 12 to 24 hours when bagging feed at around 60 percent moisture, bagging can virtually eliminate those “inevitable” quality losses to seasonal rains. Plus, that narrower harvest window allows hay to be more often harvested at its ideal maturity. Other benefits of bagging hay as haylage include greater regrowth and lower protein losses to leaf shattering, as well as less equipment, trampling and crown damage and less sun shading under windrows.

B bagging likewise improves the speed of handling when harvesting corn silage. Using a typical 3-ton packing tractor, bunkers can generally only be packed at a rate of 5 to 6 tons per hour. However, because packing takes place as the bags are filled, bagging improves the overall speed of the process. Plus, with bunkers, it often takes an additional several days before the top gets covered with plastic—if it gets covered at all. Only about half of bunkers wind up getting covered, by some estimates.

**Flexible feed inventorying.** Because they represent the most flexible form of storage—short of piling—bags are ideal for segregating feedstuffs to better target nutrition between low- and high-produced and transition cows, a practice that three of four 200-plus dairies now follow. Bags also add flexibility to the nutrition program in other creative ways:

- They allow individual hay cuttings to be stored in individual bags, eliminating the traditional packing problems when trying to put an entire season’s haylage in bunkers.
- Silage can be bagged so that one day of harvesting will fill one bag, ensuring homogeneity.
- Each field of forage harvested under different conditions can be stored in its own bag.
- Separate bagging permits easy interruption of harvest during bad weather, for instance, while still maintaining the distinction between batches of forage chopped at different maturities—an option that's virtually impossible with concrete storage.
- Bagging allows you to focus on protecting the highest quality feedstuffs first by bagging, and devoting lower quality feedstuffs to any existing bunker or upright silo’s. That flexibility permits operations with large feed demands to protect the highest income-producing feedstuffs for use in the most demanding stages of production.

**Tips to manage bagged silage**

- Use a quality bag. They resist sun damage, control oxygen infiltration and have proper tensile strength.
- Use an inoculant. It rapidly reduces pH and prevents heating.
- Locate bags on a flat, solid foundation—either concrete, crushed stone, packed gravel, or ag lime.
- Maintain weed control.
- Ensure that feed-out crews also inspect bags for tears. Repair immediately.
- Buy quality equipment from a reputable dealer.

**Precise formulation.** Samples can easily be tested from various spots in the bags prior to feeding, making quality monitoring and segregation of feedstuffs more practical than ever. It allows for more rapid changes in TMRs when tests indicate they’re necessary.

**Easy phase-in.** A bag system can be introduced to your present system by a custom operator or rental, prior to purchase. Storage expansion for larger herds becomes more gradual, less all-or-none. And on the flip-side, purchasing bagging equipment may offer you alternative income opportunities by custom bagging for smaller neighboring herds that can’t justify their own equipment purchase.

**Improved employee management.** Surveys show the average U.S. dairy that milks more than 200 cows now employs about 13 outside workers. That expanding demand for good labor will make labor management a growing concern. Bagging can help squeeze efficiencies from that labor by improving the speed and automation of the packing and sealing process. In addition, because it’s been shown to be safer than other storage methods, it helps protect those valued employees from potentially costly workplace accidents.

**Bagging increases options**

The flexibility of a bag-based system allows easier and more economical storage of alternative commodities, including:

- Cotton seed
- Beet pulp
- Agricultural by-products
- Dry grain
- Brewer's grain
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  - From 65 to 150-HP PTO applications.
  - Up to 425-HP self-propelled.
  - Handles 100,000 tons annually.

- **Ag-Bag** Tri-Dura® bags
  - Specifically developed for this technology.
  - All needed diameters, 100 to 500 feet long.
  - Recyclable.

- **Ag-Bag Plus®** inoculant
  - The only one made for bagging.
  - Soluble or dry.
  - Lactic-acid producing strains and 2 enzymes.

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  - Ag-Bag Flex-A-Tuber® for high-moisture round bales, oxygen limiting.
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