



# Dairy Briefs



The Latest Information  
on Dairy Cattle Nutrition

## Maximizing Corn Silage: From Field to Cow

Laura Martin, M.Sc

Another harvest season is fast approaching and planning ahead can help take some of the stress out of this season and help make good quality feeds for the next year. There are some tools and tricks for getting the most out of the field and into the cows. Now is a good time to sit down with your forage team and discuss getting everything you can from this year's harvest.



As every producer knows, the goal in forage making is to make consistent, good quality forage that will support milk production in the cows. To keep the forage as consistent as possible, the key is to plan ahead. As the bunks and silos empty, it is a good time to look at any maintenance that may need to be done before putting new forage in. Check silo roofs and silo/bunker walls for necessary repairs. Cracks in walls or around silo doors can allow air into the storage space which could affect fermentation or contribute to spoilage. Rainfall on forage can trigger additional nutrient loss due to seepage so it's important to make sure the silo roof is doing its job to keep rain out of the silo.

Consider how the forage will be fed out when planning on what bunks to fill. Putting forage that will be fed out at a low rate into a large bunk or silo can increase forage losses at feed out due to spoilage. Feeding forage out of any storage system introduces oxygen to the forage and can increase dry matter losses. Also keep in mind what time of year this forage may be fed, as that will impact the feed out rate. Some minimum feed out rates depending on storage type and weather are suggested on Table 1. Matching the forage crop with the appropriate storage option to keep up with feed out rates can help get more

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*Maximizing Corn Silage: From Field to Cow*  
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forage from the field and into the cows.

**Table 1: Feed Out Rates for Corn Silage**

Storage Type	Cold weather (inches/day)	Warm Weather (inches/day)
Tower Silo, oxygen limiting	2	2
Tower Silo, top unloading	2	4
Bunker/Silage/Silo Bag*	4	6

From Bickert, et al. 1997  
 \*If density is less than 13 lbs/ft<sup>3</sup> faster feed out rates are required.

This loss of forage from field to feed bunk can be a costly problem on any farm. It is important to reduce these “shrink” losses to get the most out of your fields. According to Keith Bolson, Kansas State University, an estimated 20% of corn silage is lost each year to shrink. For a farm planting 35 acres of corn silage this is 7 acres of feed - acres that have been worked, planted, sprayed and harvested - that will not be available to be fed to the herd. These shrink losses can come from handling the forage at harvest and feed out, from forage lost to spoilage, and from microbial deterioration during fermentation and storage. Hay-crop forage losses can be even higher due to higher losses at harvest.

Harvesting crops at the correct moisture is not only important for producing a good quality, consistent forage, it can also impact shrink losses. Table 2 shows the ideal moisture ranges of conventional or BMR corn silage for different storage types. Harvesting a crop, whether it is corn silage or haylage, too dry allows for lightweight particles to be lost at many stages along the way: from field to wagon, from wagon to silo/bunk, and at feed out. Cleaning up spilled forage and adding it to the forage mass at the end of each day can help minimize this loss. Moisture at harvest also impacts how well the forage will pack into the silo/bunk. Forage that is too dry will not pack well and leave pockets of air that may cause further deterioration of the forage. Harvesting crops too wet allows for nutrients to be lost as forage ‘juice’ seeps out. The liquid that seeps out of silage contains soluble carbohydrates and their loss can lower the energy and quality of the forage. Additionally, forages that are too wet may not ferment as well as those harvested at the correct moisture and may have problems such as clostridial fermentation.

**Table 2: Effect of Storage Type on Harvest Moisture**

Storage Type	Conventional Corn Silage	BMR Corn Silage
Silo	62-65%	64-67%
Bunker	65-68%	67-70%
Bag	60-68%	62-70%

The density of the forage in any storage system is essential to making quality forage. Packing forage to the correct density reduces the amount of air pockets in the forage mass and also prevents oxygen from penetrating the mass throughout the storage period. Table 3 shows how dry matter loss is influenced by packing density. Packing forages for higher density also increases the amount of forage that will fit into a bunk/silo, reducing storage costs. Even forage stored in silos should have the top surface levelled off and packed down. The University of Wisconsin has a spreadsheet available online for bunker silos that will help calculate potential packing density based on bunker size, forage moisture and delivery rate, layer thickness and number/weight of packing tractors. This is a good

management tool for producers to use to help judge where changes can be made to help improve packing density in a bunker silo.

**Table 3: Packing Density Effect on Dry Matter Loss**

Packing Density (lbs DM/ft <sup>3</sup> )	DM Loss @ 180 days (%)
10	20.0
14	16.8
15	15.9
16	15.1
18	13.4
22	10

From Ruppel, 1992

One of the most time consuming and least liked chores after harvest is to cover forage stored in bunks. However, it is also one of the most important tools a producer can do to help prevent the forage from spoiling. Bolson has some tips for covering forage to reduce spoiling:

- seal the forage immediately after filling
- use two sheets of polyethylene rather than a single sheet
- overlap sheets by 3 to 4 feet to prevent air or water getting in through gaps
- arrange the sheets so that water run-off doesn't enter the forage mass
- uniformly weigh the sheets down
- monitor the sheets throughout the year and repair any damage

It is also recommended that the area surrounding silos/bunkers/silo bags be kept cleaned and mowed to discourage rodents and other animals from disturbing the forage.

Preventing shrink loss from microbial deterioration is something that is often overlooked. This type of loss is hard to see even though 5-20% loss may occur before there are any visible signs, such as moulds. If heating is occurring, in the bunk or silo, forage dry matter and nutrients are being lost. Preventing oxygen from getting into the forage mass can help reduce microbial deterioration as most microbes need oxygen to survive. Ensuring a fast and effective fermentation can also reduce the amount of nutrients and dry matter lost in this way. Using a silage additive, like Silo Guard II, is recommended by most forage experts to reduce dry matter losses during fermentation.

As bunkers are packed, or silos are filled, using Silo Guard II can help create a high quality end product. Silo Guard II helps to remove pockets of oxygen from the fermenting forage. This helps stop mould and yeast growth common in the first stages of fermentation. Enzymes in Silo Guard II speed up fermentation by providing naturally occurring fermentation bacteria with energy. Faster fermentations mean that more nutrients are preserved in the fermented forage and less dry matter is lost to bacteria during the ensiling process. Research has shown a dry matter recovery for corn silage of up to 6% with Silo Guard II. The economics of a 6% dry matter recovery can be seen in Table 4. This improvement in dry matter recovery is often more than enough to cover the cost of treating your forage with Silo Guard II. Even after accounting for the cost of the product the benefits of using Silo Guard II are clear. Not only is there less dry matter loss but the silage at feed-out is a higher quality as less nutrients have been lost.

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Research has shown that this higher quality feed actually translates into improved milk production in dairy cows.

**Table 4: Silo Guard II Dry Matter Recovery Economics**

	No Forage Additive	Forage Additive
DM Recovery Advantage	0%	6%
Quantity Ensiled	286 T	286 T
Silage Dry Matter	35%	35%
Quantity Ensiled (DM Basis)	100T	100 T
Dry Matter Recovery	87 T	94 T
Advantage Over No Additive		7 T
Price of Corn Silage (As Is)	\$55.00	\$55.00
Price of Corn Silage (DM)	\$157.14	\$157.14
Extra Silage Over No Additive		\$1100.00
Cost of Forage Additive (Dry)		\$4.27/kg
Application Rate		0.5 kg/T
Cost per Treated Tonne		\$2.14
Example Cost (As Is)		610.61
<b>Net Value of Extra Silage after Additive Cost</b>		<b>\$489.39</b>

Good management of forage storage is the key to producing quality feed and reducing shrinkage losses. The University of Wisconsin also has a spreadsheet available online that allows producers to see how improving different areas of forage management can reduce the amount of money lost to shrink. Before the harvest season arrives and everyone on the farm is busy getting crops off, sit down with your forage team and discuss different ways to improve forage management and set some goals for the coming season.



**Potential Benefits**

- Helps replenish lost electrolytes.
- Provides buffering to help the production of rumen bugs.
- Promotes dry matter intake and helps increase ration digestibility.
- Helps improve milk production during hot weather.
- May help reduce breeding problems during heat stress conditions.



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