Managing corn silage harvest and feed bunk for nutrient retention

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> **Managing corn silage harvest, filling, packing, and feeding are essential to a dairy farm, especially when feed and/or milk prices are high**

Superior practices for harvesting, packing and feeding silage are essential to the financial status of dairy farms. The results of the corn silage harvest will impact the farm for a whole year or more. Retaining the valuable nutrients in corn silage is important in feeding for high production in dairy cows and in protecting the environment.

Harvesting

Whole plant moisture is the best method to determine when to start chopping. Kernel milk line is not the best indicator of corn silage maturity. Digestibility of neutral detergent fiber (NDF) and starch is closely linked with whole plant moisture (or dry matter). Whole plant dry matter between 30-35% indicates the digestibility of NDF and starch are optimal. It is important to harvest when NDF digestibility is high because a 1 percent unit increase in NDF digestibility is associated with an increase of 0.55 lb of 4% fat corrected milk. Storage type will determine which moisture level will result in optimal fermentation. See Table 1 for moisture/dry matter goals by storage type.

If silage is harvested too wet, fermentation will be dominated by undesirable clostridial fermentation which may result in poor animal intake and performance. Silage put up too wet will also seep, leaching valuable nutrients in the environment. If silage is harvested too dry, starch digestibility will be lower, silage will be difficult to pack, too much oxygen will be present, and can result in heating and molding of the silage.

Table 1: Moisture goals by storage type

Storage type	Moisture Goal	Dry Matter Goal
Horizontal bunker	70-65%	30-35%
Silo bag	70-60%	30-40%
Upright silo	65-60%	35-40%

When the corn silage crop has been determined to be ready to chop, harvest quickly to minimize the exposure to oxygen. Chopping, spreading, and packing the crop within two hours will minimize losses due to exposure. Chopping at the proper length of cut, generally 3/8” for unprocessed and ¾” for processed silage will ensure proper compaction and minimize oxygen entrapment. Using a kernel processor will increase starch availability and reduces waste from uneaten cobs. As chopping is occurring, silage must be checked to ensure that kernels are being thoroughly processed, not just nicked. Checking the degree of kernel processing will only take seconds, but will save lots of money in corn grain feeding all year. Raising the cutting height from 6” to 18” will increase total plant digestibility at the expense of yield.

Packing

A reasonable goal for packing density of corn silage is 14 lb DM/ft^3, however many producers struggle to meet this goal. Obtaining good silage density throughout the pile, including the sides of the pile, is an essential step in obtaining high quality feed. The layers being packed should be no more than six inches. Thicker layers trap more oxygen and result in poorer quality feed.

With the introduction of custom corn silage harvesters using large equipment, it is easy to fill bunkers too fast for adequate packing. As a general rule, the calculation for how many tons per hour can be adequately packed, divide the tractor weight by 800. For example, if the packing tractor is 24,000 pounds, then the tractor should be able to pack 30 tons per hour of corn silage (24,000 /800 = 30). This assumes that the tractor is continuously packing. If short of packing weight, consider adding another tractor, adding weight to the front or rear of tractors, adding tire weights, or slowing down harvest.

Covering

Finally, cover and seal the bunker or pile tightly and quickly after harvest. When silage is not covered, air and moisture can easily enter the silo and adversely affect both the ensiling process and the quality of silage during storing and feeding. This creates a great potential for excessive dry matter and nutrient losses and moldy feed. Without a cover, the extent of losses in the top 2 to 4 feet is far greater than most realize. Several studies at Kansas State University have reported at in an uncovered bunker there was at least a 30% loss from the top 3 feet versus bunkers covered with plastic sheeting weighted down with tires. This loss is not including spoiled feed, this is feed that has been washed away, blown away, or evaporated. For example, there is over 200 tons of dry matter in the top 3 feet of a bunker 80′ wide x 140′ long. Properly covering the bunker could prevent the loss of about 80 tons of dry matter worth $11,429 (corn silage at 35% DM valued at $50 per ton as fed). This does not take into account any negative effects that feeding the spoiled silage left in the bunk would have on intake, milk production, or reproduction. A simple spreadsheet model has been developed that you can use to assess the cost:benefit of covering your bunker silo(s). Too access the spreadsheet click **HERE** or e-mail thomasc@msu.edu and request the “Bunker Silo Covering Model.”

After placing plastic sheeting over ensiled forage, the plastic sheet must be weighted down. Tires are the most commonly used weights, and they should be placed close enough together so they touch (about 20 to 25 tires per 100 sq. ft.). To reduce the number of tires needed and to prevent water from pooling inside the tires, cut tires in half and place the open side down. There are also gravel bags and weighted material available that eliminates the need for tires.

In addition to the standard bunker management practices, the last few years have brought a number of shrink reducing improvements to the industry including oxygen

barrier plastic covers that yield almost zero spoilage on the top, covering sidewalls with plastic, overlapping plastic, and aerobic stabilizing inoculants.

Feeding

Maintaining a clean, smooth face surface during feed out will reduce feed loss.

Any method of silage removal that results in gouges, fractures and holes allows air to penetrate deep into the pile leading to increased spoilage. Bunker silos that have silage removed using a facer will reduce feed losses. It is important to ensure that all loosened silage is fed. Because particle length can be shortened when using a facer, it is important to monitor particle length.

Slower feed out results in increased aerobic spoilage. Studies have shown that oxygen can penetrate up to 3 feet into a bunker. Recommended silage removal rate is at least 6-12 inches per day in the summer and 4-6 inches per day in the winter. The amount of spoilage will depend on the feed out rate, silage stability, bunker density, and the degree of face disturbance.

Conclusion

Managing the corn silage harvest, filling, packing, and feeding are essential to a dairy farm, especially when feed and/or milk prices are high. Good bunker management ensures high quality feed can be provided to the animals, feed waste is kept to a minimum, there is minimal environmental impact, and feed costs are under greater control.

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