# The Times to Remember During Milking Time

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When it comes to milk quality and mastitis, we usually spend a lot of time talking about keeping the cow's environment clean, treatment of mastitis, and common mastitis pathogens. Those are all very important, but don't forget about another piece of the milk quality puzzle - milking time. Whether you milk in tie stalls or a parlor, the principles are the same, and they are all about the timing. Keep these "times" in mind for the milking time on your farm.

## 10-20 seconds

This is the amount of stimulation time the teat skin surface requires for optimal milk letdown. This can include wiping the teats and cleaning them of any dirt and manure. However, the most powerful milk letdown stimulus is fore stripping each teat. This also allows you to check for any visual symptoms of mastitis (such as milk with flakes, clots, or an off color). If a cow has not letdown her milk, the extra machine pulsation can lead to damaged teats and teat ends. This negatively effects udder health and can lead to a higher incidence of mastitis.

## 30 seconds

This is the ideal amount of contact time. Contact time is the time required for teat dip to kill bacteria on the teat surfaces. Dirt, manure, and bedding should be cleaned off of each teat before dipping to ensure full skin contact. The key to effective use of teat dipping for mastitis control is consistent and complete teat coverage at every milking. When hastily preparing cows for milking, it can be easy to miss a teat or have incomplete coverage.

An easy way to test yourself (or your employees) is by using the White Towel Test. It's a great option because it offers immediate feedback and can be used for pre- and/or post-dipping. To do the test, wrap a clean paper towel around the base of the teat immediately after it has been dipped. Be sure to blot the dip from the entire teat. Unwrap the towel and open it to display the teat dip pattern.
A completely (and correctly) dipped teat will give a full, singular blot on the paper towel. A broken or uneven blot is representative of an improperly dipped teat.

**60-120 seconds**

One to two minutes represents the goal time frame for prep lag time. This is the time from the initial contact with the teat surfaces until the milking machine is applied. The prep-lag time for cows being milked 2 times per day should be shorter than cows being milked 3 times per day. In a typical parlor setting, prepping four cows at a time will accomplish proper prep lag time for each cow, given there is consistency in stimulation and contact time. For stall barn application, the use of an end-of-milking indicator is helpful in organizing the milking routine.

**30 minutes**

This may be one of the most important times to remember. After milking, the teat sphincter takes 30 minutes to close. It also takes 30 minutes for the post-dip to dry. If a cow lies down while the sphincter is still relaxed or before the teat dip has dried, it can lead to bacteria entering the teat and potential infection. It is estimated that 50% of new contagious mastitis infections can be prevented by complete and consistent post-milking teat dipping and allowing the dip to dry. A good way to keep cows standing for at least 30 minutes after milking is to provide fresh feed (or push feed up) so the cows are motivated to stand and eat after milking.

The ideal pre- and post-milking procedure should be standardized to maintain consistency between all milkers. It should also focus attention on the teat surfaces, include an effective teat dip, and remove all dirt and manure from the teat surface including the teat ends. Most importantly, it should include the times:

- 10-20 seconds of stimulation for milk letdown
- 30 seconds of contact time with teat pre-dip
- 60-120 seconds of prep-lag time
- 30 minutes of keeping cows standing after milking

For additional resources related to milk quality and mastitis management, visit University of Minnesota's Quality Count$.

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**Kernel Processing and Chop Length Goals**

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Producers who feed corn silage to their dairy cows or custom chop for customers understand the significance of good silage processing. As planning begins for this fall’s corn silage harvest, it’s a good time to ensure your operation is prepared for proper chop length and kernel processing of corn silage.

**Hybrid impact: starch yield and moisture level**

When grain prices are high, dairy producers tend to take a very close look at whether corn particles are showing up in manure. When looking for clues as to why lost particle volume is high, it pays to review hybrid selection. Improperly processed corn kernels passing through cows may be more common in recent years due to corn growers’ hybrid selection to maximize starch yield.

Hybrids with high late-season plant health traits continue to deposit about 1 percent starch in the kernel for every 1 percent drop in whole-plant moisture as the crop enters into maturity stages for silage harvest. Therefore, the decision to harvest the crop at 63 to 65 percent moisture should produce approximately 5 percent...
more starch compared with traditional silage harvested at 68 to 70 percent moisture.

**Equipment inspections**
To ensure good kernel processing during harvest, it is important to make sure the entire chopper is in good condition, especially the chopper knives and roller mill. Replace nicked knives and shear bar if showing smooth edges.

Replace rollers, too, if they show signs of wear. Uneven wear of roller teeth may prevent narrowing of the roller gap because the outer edges of the rollers may touch, leaving an undesired wider gap in the middle. The integrity of the working parts of the roller is dependent on types of soils and other environmental factors. Corn grown on sandy soils where wind is quite common will produce more wear and tear on the moving parts.

Make appropriate adjustments after completing inspection of the chopper head and roller mill. The gap setting between the rollers should be 1 to 2 mm, which should crack all the kernels.

**Equipment settings — theoretical length of cut**
Next, set the theoretical length of cut (TLC) at three-fourths of an inch, which is longer than typical TLC settings for unprocessed corn silage. Processed corn silage requires a chop length that isn’t excessively long to ensure sufficient particle length for ideal packing and fermentation in the silo, yet long enough to provide particles that supply cows with effective fiber for cud chewing and rumination. The feed roll speed determines chop length, so speeding up feed rolls produces a longer chop length.

Harvest moisture also impacts kernel processing. A TLC thumb rule is to shorten the TLC setting when harvesting drier corn; this may lower effective fiber but will ensure adequate packing of drier forage in the silo. Slowing down feed rolls causes less forage to be pushed through the chopper drum, which results in a shorter chop length and a lower tons-per-hour chopper capacity. This requires more time to adequately process the crop.

**Equipment settings – roller settings**
All brands of harvesters in good working condition can achieve well-processed corn silage, provided attention is given to the nature of the crop being harvested. The grain-to-stover ratio of the crop affects how much grain is going through the roller mill. The higher the grain content, the greater the need for more aggressive processing. Sometimes that means high-starch corn silages going through roller mills with a 1- to 2-mm gap may need a shorter TLC.

If feed roll and roller mill adjustments don’t produce expected kernel processing results, then inspect the differential speed. The upper roller runs faster than the lower roller during processing, and differential speeds of 10 to 15 percent are quite common among the various manufacturers. But when processing expectations aren’t being met, it will help to install a smaller sprocket on the upper roll to increase differential speed to 20 percent or more.

In response to the needs of dairy producers, some manufacturers have engineered roller mills to accommodate a 30 to 50 percent differential speed. Of course, it’s always best to refer to the manufacturer’s specifications to obtain specific information for adjustment settings.

**Field monitoring**
Because processing effectiveness may change from field to field and from day to day, it is very important to monitor kernel processing throughout silage harvest. During harvest, samples should be checked at least once daily and when switching from one field to the next. In some cases, dairy managers inspect every load coming to the silo for degree of processing.
Establish a field monitoring system during harvest to determine the degree of kernel processing. The dairy manager can inspect loads of forage coming to the silo for kernel damage and then inform the chopper operator if adjustments are needed to improve the degree of processing.

**Field monitoring techniques**

Some forage experts use a quick and simple on-farm monitoring technique that involves collecting a 32 ounce cup of chopped forage for field analysis. Spread the collected sample onto the cement silo apron or pickup tailgate and manually sift through the entire sample, counting all half or larger kernels. A nicked kernel is not enough; kernels need to be completely fractured.

While this is a qualitative observation, a recommended guideline is that no more than two whole or half kernels should be counted per sample. The actual kernel number can be agreed on by the dairy producer and chopper operator; however, the count should never exceed five whole or half kernels.

Pioneer dairy specialist Dann Bolinger conducted a field test in Michigan to compare the 32 ounce cup technique to commercial laboratory Ro-Tap tests. The tests determine the percentage of starch from a dried sample that will pass through a 4.75-mm screen, which is considered highly digestible starch for cattle. Data revealed that a kernel count of four or fewer produces an ideal 70 percent kernel processing score.

The following table summarizes Ro-Tap corn silage processing scores (CSPS) from Dairyland Laboratories Inc., based on 1,921 corn silage samples from the 2009 through 2013 harvest years. Although many growers have kernel processors on their harvesters, it seems there is definitely room for improvement on kernel damage because a corn silage goal should be to always achieve optimum CSPS.

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Photo of cows on pasture with the Southern Alps of New Zealand, January, 2016. L. Kung, Jr.
These are the processing interpretation guidelines for the laboratory Ro-Tap system:

- Less than 50 percent = inadequate
- 50 to 70 percent = normal
- 70 percent = optimum

Most modern-day dairy operations pay a great deal of attention to business management decisions that have a direct impact on the ability to produce milk most efficiently and at the highest level of profitability. Therefore, it makes good business sense that the dairy operation requires well-processed corn silage for maximizing dairy production. And to get that good silage, good harvest practices must be in place from start to finish.

Getting to Know New Low Lignin Alfalfa Varieties

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(The author was a former employee of Vita Plus)
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Lignin is the primary fiber component that reduces fiber digestibility in ruminant diets. Because alfalfa contains high lignin concentrations (greater than 6.0 percent), alfalfa fiber digestibility is often compromised as compared to low lignin forages such as BMR corn silage (with a 2-percent lignin concentration).

As a result, plant breeders have sought to reduce lignin concentration in alfalfa - either through plant selection or by genetic engineering. Two companies have recently patented technology for low lignin alfalfa. Their hope is to provide greater flexibility in extending the harvest window, maximizing yield potential while maintaining quality.

The first company is Alforex Seeds, which is affiliated with Dow AgroSciences. Alforex has developed low
lignin alfalfa through conventional plant breeding and selection. The seed is marketed under the name Hi-Gest®. It is available through distributors and dealers as well as the company’s website.

The second company is Forage Genetics International and its seed will be sold under the name HarvXtra™. HarvXtra was developed in partnership with the Samuel Roberts Noble Foundation and the U.S. Dairy Forage Research Center, along with Monsanto. A 2016 release is anticipated, pending deregulation from the USDA.

HarvXtra has been developed through genetic engineering. Essentially, developers “knocked out” or “turned down” the gene expression for key enzymes in lignin biosynthesis. Although the company is not selling the seed in 2015, some small acreage will be established on a few commercial dairies this year. HarvXtra will be stacked with the Roundup Ready® gene.

Research evidence and company claims suggest total lignin concentration is reduced by 7 to 15 percent over conventional alfalfa varieties. With genetically engineered low lignin alfalfa, the type and structure of lignin is also altered. Reductions and alterations in lignin concentration will vary greatly with cutting management, growing conditions and weather.

The proposed benefits of low lignin alfalfa may be different compared with the benefits of low lignin BMR corn silage.

Because harvesting alfalfa at the desired maturity is such a challenge, the proposed benefits of low lignin alfalfa include a more flexible alfalfa harvest window (adding 7 to 10 days), thereby maintaining quality during challenging harvest conditions. Additional benefits observed in research evaluations have included increased digestibility, improved animal performance, and/or potentially increased total alfalfa yield. Since lignin serves as the “skeleton,” providing support to the plant as it matures, one question that invariably comes up is whether low lignin alfalfa will be more prone to lodging. Both companies claim, in field testing and plot research, reduced lignin has not significantly increased lodging as compared to conventional alfalfa varieties.

If low lignin alfalfa truly extends alfalfa cutting intervals, these varieties may increase long-term alfalfa stand yields. Research evaluating HarvXtra has explored reducing alfalfa harvest from a four-cut to a three-cut system. Due to increased plant reserves, less soil compaction and damage, and less plant stress, yearly plant tonnage actually increased. Limited data indicates a positive influence in stand persistence. Alternatively, many alfalfa producers may choose to stay on the same alfalfa cutting schedule hoping to improve fiber digestibility.

Only a few peer-reviewed studies are available. In a USDA study, lambs fed HarvXtra had increased weight gains. Similar to BMR corn silage, lowering lignin should translate into increased NDF digestibility and enhanced animal performance, but field responses may be more challenging to observe due to common inclusion levels of alfalfa in modern dairy diets. Corn silage often comprises greater than 60 to 70 percent of the forage base, making responses to BMR corn silage easier to observe. In many situations, it is expected that the inclusion level of low lignin alfalfa in dairy diets will be appreciably lower than corn silage inclusion levels, making animal performance more challenging to observe.

In summary, benefits to low lignin alfalfa may include improved forage quality (if similar cutting schedules are maintained) or better labor efficiency (due to reduced cutting frequency). Agronomic data has shown increased yields with low lignin alfalfa when a cutting is eliminated, largely due to healthier plants. This strategy potentially reduces machinery and labor cost and field damage. Finally, data on animal performance is very limited.

Time and application of this new technology will prove its role in today’s dairy diets.
Revisiting Recommendations for Good Packing Densities in Bunker and Pile Silos

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Over the last decade, general recommendations of packing densities in bunker and pile silos can be found to range between a minimum of 14 to 16 lb of dry matter (DM) per cubic foot. Generally speaking, alfalfa silage packs tighter than corn silage and wetter silages are easier to pack tightly than drier silages. However, recommendations based on lbs of DM per cubic foot are not the best way to plan for optimal densities. In brief, DM densities do not accurately describe the amount of air space in the silage mass, which really is the factor we should be worried about. Instead, “porosity” better describes air space among particles. Movement of air among particles is a factor that controls silage fermentation. If a silage mass is highly porous this means that air can move into the mass. This is obviously undesirable as air stimulates the activity of aerobic bacteria that can lead to losses of DM and nutrients and air stimulates the growth of yeasts that degrade lactic acid and causes aerobic spoilage. “Porosity” itself is difficult to measure but it is highly related to “bulk density”. The new target to shoot for instead of 14 to 16 lb of DM per cubic foot should now be to achieve a minimum “bulk density” of 44-45 lbs of wet forage weight per cubic foot. There is one less step in attaining this value for you as a producer because it does not require a “dry matter” determination of the forage. Thus, no matter what the DM content of the forage going into the silo is, the target should be that minimum. In reality, a corn silage sample with a DM content of 30% will have a DM density of about 14 lb of DM per cubic ft while a similar sample with 40% DM will have a DM density of about 17 lb of DM per cubic ft. This is true even if both are packed at a “bulk density” of 44-45 lb of wet forage per cubic ft. Thus, more packing is needed when forage DM increases. Work with your nutritionist or extension agent to help you ascertain if your silos are adequately packed.

Remember - UD Dairy Extension Resources are on the Web!

UD Animal Science Extension Blog - short info articles updated monthly
http://extension.udel.edu/animalscienceblog/

UD Dairy Extension Resources - links to fact sheets, news letters, and Dairy Day Proceedings