GEA Farm Technologies

milk QUALITY SPECIALIST newsletter

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IN THIS ISSUE:

USA | CANADA

Got Scheduled Maintenance?

The most intensely used equipment on a dairy operation is contained within the milking system. And, well-documented research proves that proper performance of this equipment has a positive influence on milk quality, cow health and parlor throughput.

However, because of its intensive use under tough environmental conditions, milking system performance and reliability will deteriorate over time, if proper care is not given, having a significant impact on profitability.

A correctly performed scheduled maintenance program will evaluate and benchmark the milking system operating parameters, and replace and/or clean parts that can impact machine function - both of which help to provide a continually optimal milk harvesting process.

If a dairy is not part of a scheduled maintenance program, they are compromising milk quality, cow health, and parlor performance. In short, they are compromising their profitability.

-Sergio Reinert, Product Manager – Services Development and Spare Parts

Scheduled Maintenance and Milk Quality

The Standard Plate Count (SPC) is the most common measurement used to determine the number of bacteria found in raw milk produced and stored on the farm. SPCs normally remain consistent from day to day, but increases can point to problems with dairy facility and cow hygiene - and sometimes elevated SPC counts specifically indicate a problem with milking equipment hygiene.

High SPCs affect milk quality, which is important to producers because as milk quality improves, typically the amount of bonus dollars milk processors offer to dairymen improves as well.

If a dairy is not part of a scheduled maintenance program, they are compromising their profitability.

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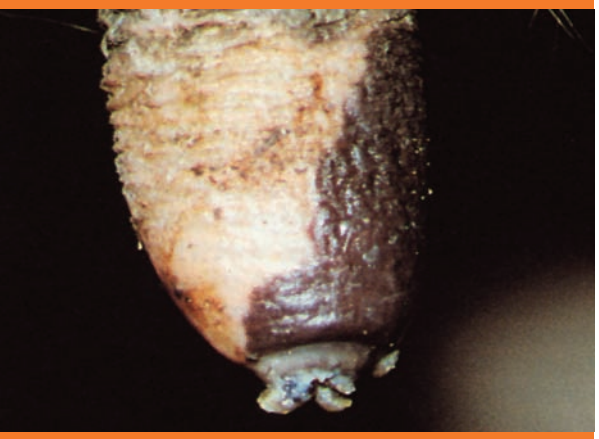
Importance of Evaluating and Servicing the Pulsation System

Pulsators must provide the correct proportion of vacuum and massage of the liner on the teat end.

If the vacuum (milking) phase is too long, it will affect the circulation of fluids at the teat end, leading to congestion. This reduces the internal diameter of the teat canal, reducing milking speed. Cows become uncomfortable during milking and unit kick-offs increase, reducing parlor efficiency and milk quality. Congestion will also cause an excessive amount of keratin production, leading to hyperkeratosis. Hyperkeratosis can contribute to increased cases of mastitis, because it makes it more difficult to clean teat-ends, therefore, harboring bacteria that can threaten udder health.



On the other hand, if the massage phase is too long, it will reduce milk flow and, consequently, reduce milking speed.

Recent research indicates that the milking phase, 50% of phase A, 100% of phase B and 50% of phase C, should be 500 to 750 milliseconds long. GEA Farm Technologies recommends that phase B alone, should last between 485 and 500 milliseconds and phase D, should be at least 200 milliseconds. Servicing pulsators regularly and verifying their performance with the Tri-Scan is fundamental to obtaining a continually optimal milking session.

In combination with proper facility and cow hygiene, a good scheduled maintenance program will help maintain equipment performance and, consequently, help protect milk quality. Below are a few highlighted examples:

- **Monitoring Air Flow Reserve**

Effective air flow reserve refers to the capacity of the vacuum system to cope with unplanned air admitted into the milking system. Milking systems with less than recommended air flow reserve can influence vacuum drops during attachment and detachment of milking units, adding risks of machine related udder infections. Low air flow reserve can also influence the system's cleaning performance by reducing turbulence, or the physical cleaning force required during the CIP washing process. Periodically measuring a vacuum system's effective air flow reserve allows for early detection and prevention of cleaning problems, before build-up can occur, bacteria counts increase, and milk quality is affected.

- **Checking Air Injector Operation**

Correctly adjusted and maintained air injectors are necessary to assure proper cleaning of the milking system. Air injectors control the size and length of the water slugs needed to clean within the CIP process. Their performance can be affected by blocked filters or aged components.

- **Checking Milk Pump Seals**

A defective milk pump seal will reduce the volume of solution pumped per second. This influences milk quality by not efficiently removing milk from the pump to storage. Also, this change in pump capacity will reduce the flow of wash solutions from the receiver, causing an incomplete wash cycle due to a system "trap-out". Replacing seals periodically, is the best way to prevent this problem.

- **Performing Visual Inspections**

Performing visual inspections on critical points in the milking system like receivers, claws, flow meters, and milk pipelines helps keep key components operating optimally.

- **Replace Rubber Goods**

Aged rubber components are difficult to clean, and they harbor bacteria, driving up SPC numbers. Rubber components always need to be replaced in a timely manner.

Scheduled Maintenance and Parlor Performance

Milk quality is not the only concern associated with poor milking equipment maintenance. Over-used or worn components that are not regularly serviced can reduce milking speed and even stop machine operation. This can increase labor costs, add stress to cows (reducing production), elevate energy costs, and increase emergency service call costs.

Some of the common problems that lead to reduced parlor throughput, due to a poor maintenance program are:

- **Prolonged milking times** due to improper vacuum levels and excessive fluctuations (which also make unit adjustments more difficult).
- **Reduced milk flow** due to teat-end congestion, caused by poor pulsation.
- **Milking interruptions** due to milk pump failures that cause the receiver and sanitary trap to overflow.
- **Milking unit kick-offs** as a result of poor equipment settings.
- **Excessive wear of components** that stop working, causing interruptions in the system's operation.

All of these examples, and more can be prevented through a good scheduled maintenance program - keeping throughput goals and parlor performance at optimal levels.

Why Service Kits?

Parts wear differently, according to their utilization and materials used in their composition. Some parts must be replaced after 1500 hours of operation. Others have a longer use life and will not compromise the equipment's performance until 3000, 4500, 6000 or 9000 hours of operation. The use of Service Kits will guarantee that the parts which need replacement will be replaced at the recommended time.

Scheduled Maintenance and Cow Health

Correctly designed, sized, operated and maintained milking equipment will help to keep milk quality at optimal levels. However, malfunctions in the milking system, like defective pulsation or excessive vacuum fluctuations, can represent a significant impact on udder health.

And, even though high SCCs can represent lost milk quality bonuses, mastitis will affect profitability in several other ways. Losses in lifetime milk production, reduction in pregnancy rates, cull cows, treatment costs, and discarded milk, can have an even stronger impact on profitability.

A regular scheduled maintenance program can help protect cow health by checking important components directly related with milk quality and the incidence of clinical mastitis. The results of the performed tests can be compared to industry standards and operating parameters, and potential problems can be detected at an earlier stage, preventing more major, long-term issues.

Measure Vacuum System Performance Parameters

Vacuum fluctuations are a result of un-planned air admittance into the milking system that could not be compensated by the vacuum pump. It can happen even with well-sized milking systems as vacuum pumps age, require service, or when the pump's capacity is being occupied due to air leakage compensation in a different component of the system. By checking vacuum pump capacity and effective reserve (based on NMC guidelines) during scheduled maintenance, the technician will be able to identify causes and recommend solutions to prevent long-term effects of the vacuum system on udder health.

Setting the Operating Vacuum

According to the NMC, *"An average claw vacuum between 10.5"Hg to 12.5"Hg (35 and 42 KPa) during the peak flow period is generally considered a good compromise to allow cows to be milked gently, quickly and completely."* After the adequate vacuum level is determined to operate the installation and milk the cows, it will be the vacuum regulator's function to keep levels within the desired settings. A scheduled maintenance program will check the vacuum gauge accuracy, evaluate its performance, and service the controller to avoid changes in original settings due to overuse and component wear.

Measuring Pulsation Performance

The pulsation system is a key component of the milking system (see page 2). Thanks to pulsation, vacuum can be applied to teats and create the pressure gradient needed to extract the milk safely from the udder. The pulsation system is responsible for the correct application of suction (or vacuum) and massage to the teat end. The pulsation system's performance can be affected in several ways, from dirty air filters to defective components. Potential problems with the pulsation system can be detected by checking the pulsators' performance with the Tri-Scan during scheduled maintenance. Parts that wear-out and filters, should be replaced, and pulsators cleaned internally for continued optimal function, and optimal udder heath.

Did you know?

That after 6 months of operation in a parlor with 20 milking units, milking 400 cows, twice a day, with an average milk production of 60 lbs., the pulsators will have performed more than 3.1 million pulsation cycles*! Also, in this same parlor, each milking unit will transport 215,800 pounds of milk, and the milk pump will have pumped more than 4,316,000 pounds of milk in a 6 month period.

*Calculated based on a 62 ppm pulsation rate, milking time of 6 minutes per cow, and pulsation on-time of 20 minutes per wash cycle.

Scheduled Maintenance Costs

Milking machines are probably one of the only pieces of equipment on a dairy operating 7 days a week, 365 days per year. Combine this with the importance of harvesting quality milk and maintaining udder health, and it is easy to calculate that the costs of keeping the milking system operating properly through a scheduled maintenance program is worth every penny.

Let's consider a 2 x 12 parlor, milking 400 cows, 3 times a day. This parlor is performing 1200 milkings per day. By dividing the 1200 milkings by the total number of milking units (24), we will find that each milking unit is milking 50 cows per day. This means that a single malfunctioning pulsator is putting at least 50 cows at risk on a daily basis.

Cash Flow

Periodically servicing the milking system helps to prevent operating interruptions due to equipment failure, avoiding expensive emergency calls and unexpected corrective services.

Cost Per Cow Per Day

Use the following table to calculate how much regular scheduled maintenance will cost per cow milked per day. Estimate the costs of a 12 month scheduled maintenance program considering labor and parts, etc. Divide the total yearly cost by 365 to find the program's daily cost. Then, divide the daily cost by the number of cows milked daily.

Yearly costs for a Scheduled Maintenance program (Labor & Parts)	$
Daily costs for a Scheduled Maintenance program (Labor & Parts) - *Divide above by 365*	$
Number of cows milked per day	
Scheduled Maintenance program's cost per cow per day - *Divide daily cost by above*	$

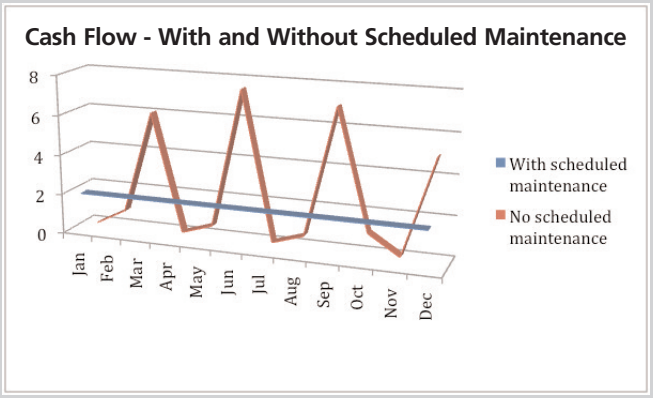
How often should the equipment be serviced?

The number of operating hours is the best parameter to use when it comes to measuring the lifetime of a wear part and determining the frequency in which a regular scheduled maintenance program should be performed.

Milking equipment should be checked and serviced, at least, every 750 hours of operation. However, on those machines operating fewer hours per day, the interval between scheduled service should never be more than 3 months.

Most equipment components, such as vacuum pumps, regulators, milk pumps and pulsators, work during milking and washing. Therefore, both processes must be considered when estimating service frequency.

Hour meters connected to the vacuum units are a very good tool to avoid risky, extended intervals between maintenance. The hour meters are generally connected to the vacuum pump control and will count hours of operation whenever the machine is turned on.



With operation 365 days per year, and significant impact on milk quality, parlor performance and cow health, it is easy to calculate that the costs of keeping the milking system operating properly through a scheduled maintenance program is worth every penny.

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