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Milking Machine and Analysis Procedures[1]

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The role of the milking machine in causing mastitis has been debated for years. The most recent research has shown that a milking system properly installed, operated and maintained has little effect on mastitis. Research has demonstrated that cyclic vacuum fluctuation (that occurs normally in the milking cycle) and irregular vacuum fluctuation (that occurs when units fall off or are carelessly handled) occurring simultaneously will increase the new infection rate. Line slip during milking will also increase the infection rate. Infection is increased because small droplets of milk are back-jetted against the teat end, with some organisms being forced into the teat. This is more of a problem with the way the unit is operated rather than with the milking machine itself.

The most common way that the milking machine influences mastitis is that the system is not maintained properly and the milking machine may damage the teat end, thus increasing the chances of mastitis organisms entering the udder. A vacuum level of above 15" Hg. will damage the teat end. This is caused by a malfunctioning or dirty vacuum controller. Malfunctioning vacuum controllers can also increase vacuum fluctuations. If the pulsators are dirty and no air is admitted, there will be a very short or no massage cycle which can cause damage to the teat end.

A recent survey in Florida indicated that 75% of the farms surveyed had pulsators malfunctioning and over 50% of the dairies surveyed had poor vacuum controller response.

This survey indicates that these two important parts of the milking system are not being maintained. They must be for proper udder health!

This fact sheet in conjunction with fact sheet DS-5, Advanced Milking Equipment Analysis Data Form, can give a complete analysis of the milking system. It also explains which parts of the system should be checked and how to do it. DS-5 also provides a record of this analysis for future reference.

Vacuum Pump - Evaluate every two months.

1. Location - Pumps should be located in a well ventilated area, clean and dust free, as close to the parlor or milking barn as possible, but isolated enough to keep the noise level in the milking area to a minimum.

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2. Check belts for wear and tightness.

3. Check rubber hoses for holes and hose clamp tightness.

4. Check filters (if present) for cleanliness.

5. CFM of pump should be checked with an orifice flow meter. The pump should be warm when checked. Do the check as close to the pump as possible, CFM is always checked at 15" vacuum, and recorded that way. Pump CFM's may also be checked at milking vacuum level if different than 15".

6. Pump should function within 10% of factory rated capacity, if not, should be cleaned or rebuilt.

System Vacuum Level - Check several places in system. Resident gauge reading should also be checked: high lines 15", low lines 13.5" Hg.

System Check (Leaks) - Reconnect vacuum pump to the system, remove or shut off controller, shut off pulsators, shut off claws or crimp milk hoses and tape them. If possible remove top of receiver jar and insert the flow meter into receiver top adapter, start pump and record CFM's - leaks should not be more than 10% of pump capacity, but often are. If receiver jar is such that it can't be used, place flow meter in pipe where controller was removed. If leaks account for more than 10% of total capacity check pipe joint leaks, etc. Minimum system CFM's are 30 CFM (A.S.M.E.) + 1.5 CFM per unit.

Controller Responses - Reconnect system into milk mode, units not on, claw still off or hoses taped, controller in place and operating. Insert flow meter into receiver jar inlet or top, close flow meter, note vacuum level, let in air through flow meter in 10 CFM increments. Note vacuum: there should not be a vacuum change + or -0.5" vacuum up to 75% of capacity of system check CFM's. If controller response is poor, check for dirty filter(s) or dirty controller body. Most dead weight controllers will not pass this test, diaphragm type are most responsive.

Vacuum Controller Leakage (optional) - Remove or block off controller, place flow meter in receiver jar with system in milk mode (as in controller response check above) obtain CFM's at 0.5" Hg or 2 kpa below normal operating vacuum level, record CFM's. Reconnect vacuum controller with flow meter in same place, record CFM's at 0.5" Hg below vacuum level. The difference between the two should not be more than 10 CFM. Some diaphragm regulators use up to 10 CFM as a bypass procedure normally. Non-diaphragm regulators should not lose more than 1 CFM.

Pulsators - Should be inspected visually for cleanliness, air inlets should be clean, free of dust and spider webs. Pulsators used in flat barns should be checked for dented air inlets (where they are allowed to hit the floor). A graph should be made of each pulsator function while all other pulsators are operating on the system. In flat barns both sides of the barn should be checked. Pulsation rate and ratio should be recorded and any abnormalities observed and recorded (pulsators not opening or closing properly, etc.). If you do not make a graph a western dairy meter may be used. If nothing else is available, a vacuum gauge may be used to check if pulsator opens and closes - milking vacuum to 0" Hg.

Cluster

1. Pulsator hoses and short air hoses should be checked for leaks, holes, cracking, etc.

2. Check claw vent: it should be open and clean if no liner vent is present, should be closed if liners are vented. If liner vents are used they should be clean and the claw vent sealed.

3. A vacuum shut off should be present on the claw or on the milk hose before the claw.

4. Liners or inflations should be free of holes and liners changed regularly; 1200 cow milkings for molded liners and 600 cow milkings for stretch bore liners.

Automatic Take Offs - Sensor jars should be located at udder level or lower if possible. If floats are used they should be right side up. Older electronic sensing tubes should be checked for old collapsed rubber tubing.

Milk Line - Slope at least 1" per 10' (1 1/2" per 10' is better) of line and should be looped, all inlets or nipples should be at the top of the line.

Vacuum Supply Line - If of P.V.C. it should be installed with enough supports to keep it from sagging and designed to be taken apart and washed.

Pulsator Lines - Should be supported to prevent low spots and have ports so it can be washed. Preferably looped and installed low enough that the pulsators can be reached without a ladder.

Stray Voltage - Anything above 0.5 volts A.C. should be avoided. A sensitive volt meter must be used and must not pick up D.C. voltage on the A.C. scale.

Places to Check:

1. Milk line to claw, one lead to the claw - the other to the milk line.
2. Claw to the floor, one lead to the claw - the other to the floor.
3. Bulk tank outlet to the milkhouse drain.

Wash System

1. Hot water: temperature 160° preferable.
2. Air injector must work for proper cleaning, a loud hiss at regular intervals usually means it works. Filter should be clean if present.