

GUIDELINE 6

Monitor and maintain milking machine function

In this guideline:

6.1 Use the daily, weekly and monthly guides to check machine function

6.2 Call a milking machine technician if you observe any abnormalities in the milking machine during your daily, weekly or monthly checks

6.3 Changing liners at regular intervals

Milking machine equipment has been designed to harvest milk efficiently and maintain healthy teats. Teats are attached to milking machines for 50-100 hours per lactation.

Machines that are not functioning correctly can contribute to new mastitis infections by:

- Spreading bacteria from teat to teat and from cow to cow
- Damaging the teat ends and natural defence mechanisms of the teat canal
- Causing impact of bacteria-laden droplets into the teat canal, especially towards the end of milking
- Reducing the degree or frequency of full udder milk-out.

The most common reason for milking machine problems is inadequate routine maintenance of mechanical components and rubberware. A series of regular, systematic checks gives a simple method of finding problems and guiding preventative maintenance.

If more than one person milks in your dairy, it is important to assign these checks to particular people, and ensure that the right person is alerted to any problems that are found or suspected.

Daily and weekly checks should be conducted by milking staff as part of their regular list of responsibilities. Monthly checks should be done by the herd owner or manager or other skilled observer. Recording the results of monthly checks enables subtle changes due to wear and age to be detected more easily.



Good Read

[Technote 6 - Monitor and maintain milking machine function.](#)

6.1 Use the daily, weekly and monthly guides to check machine function.

Daily checks

- **Read the vacuum gauge.** Check to see that the needle reaches the red line (or a line that you may have drawn on the dial). If the reading is different to normal, tap on the gauge to ensure that the needle isn't sticking. If sticking, or vacuum levels are of concern – see below for typical vacuum levels recommendations, contact your milking machine technician
- **Listen to pulsators.** The sound of air entering the external air inlet should be regular and intermittent. It should be the same sound for all pulsators
- **Observe cows during milking.** Unsettled cows may indicate a problem with the environment, or milking machine
- **Check that claw bowl is not flooding during milk flow.** If flooding, the air admission hole or vent is likely to be blocked. This can lead to more cup slip, slow or incomplete milking, and difficulty removing clusters even after the vacuum is cut off. Remove any debris with the probe designed for the task - avoid using drill bits or other tools that may enlarge the holes
- **Check milk is entering the receiver can** and flowing in smoothly
- **Check cows teats as the cups come off** for any colour changes (reddish, bluish or purplish skin colour) or swelling, hardness at the top, middle or tip of the teats
- **Check that cows are milking out properly.** Split liners, holes in the pulse tubes or short milk tubes, or faulty pulsators affect pulsation and milk out
- **Check if jettors are distorting the liner mouthpiece.** Nozzle-type jettors can distort the mouthpiece. Remove teatcups from the jettors immediately after every wash.

Typical vacuum levels recommendations

Milkline height (in meters above cow's feet)	Vacuum (in kilopascals)
1.8	48
1.6	46 – 48
1.4	44 – 46
1.2	42 – 44
Lowline (i.e. most modern rotaries)	40 – 42



[Guideline 9](#) describes teat conditions that can arise from a poorly operating milking machine.



Daily Checks - Carried out by regular milker(s)

Read the vacuum gauge	
Listen to pulsators	
Check air admission holes (vents)	
Check claw bowls are not flooding	
Watch milk entering the receiver can	
Check teats as cups come off	
Check cow behaviour	

Weekly checks

- **Check rubberware** (liners, short milk tubes, pulse tubes etc.) for holes or splits. Damaged liners and pulse tubes will affect milking out
- **Check for twisted liners.** Align marks/arrows on mouthpiece and short milk tube, or place your thumb in each liner
- **Check filter(s) on pulsators** and/or filtered airlines, especially when meal feeders are present in the dairy
- **Check drain valves on pulsation airline.** If milk is found in the drain line, look for split liner(s)
- **Listen to the regulator.** It is normal to hear air being admitted to the regulator. If air cannot be heard, it may indicate that the machine is leaking air. However, if a variable speed drive is fitted, the regulator should not be regularly admitting air
- **Check filters** on the vacuum regulator and clean or replace
- **Check oil level and oil drop rate** if the vacuum pump is oil-cooled. Check water levels and flow rates if vacuum pump is water-cooled
- **Check teat ends for cracks or sores.** As a general rule, take action if more than 5% of cows have teat end sores or cracks.



Weekly Checks - Carried out by regular milker(s)

Check rubberware for damage	
Check for twisted liners	
Check pulsator filters or filters on filtered airline	
Count cup squawks and slips requiring correction by milker	

Monthly checks

- **Check effective reserve and regulator function.** Effective reserve is an airflow measurement of the spare or reserve pump capacity that is available to maintain stability of the receiver vacuum when extra air enters the system during milking. All systems should be able to accommodate 1 milking unit falling off (2 units in systems with more than 32 bails).



A simple test to try when the machine is running is to open 1 set of cups (or 2 sets if more than 32 units). If the vacuum drops more than 2 kPa, then effective reserve is not adequate. Call your milking machine technician.

Cup slip during cup attachment or when cups are kicked off will also indicate poor vacuum reserve. Variable speed drives, when poorly adjusted, may cause similar problems.

- **Check for rubberware that is perished** or outside manufacturer's guidelines. Cracked and perished rubberware is harder to keep clean, and may cause a downgrade in milk quality. Distortions of the mouth piece lip can affect milking and washing processes.
- **Check if level of cup squawks** and slips requiring correction has noticeably increased. A running tally over 15 minutes of milking provides a useful measure. Exclude cows with very poor udder conformation that always have cups slip. Note that:
 - Preferred machine function - no more than five slips per 100 cows
 - Machine requires service - more than 10 slips per 100 cows.
- **Check completeness of milking** i.e. under milking and milking times. See tables below for guidelines on assessing milk-out and milking times.

Guidelines for assessing completeness of milk-out

Record milk-out as:	Qualitative checks	Semi-quantitative checks (hand-strip individual quarters)
G (Good)	Quarter is visibly wrinkled	5 or fewer easy strips (equating to <50mL per quarter)
P (Poor)	Quarter appears slightly plump, possibly indicating unharvested milk	10 or more easy strips (equating to more than about 100mL per quarter)
U (Uneven)	One particular quarter appears plumper and less wrinkled, relative to the other quarters	

Guidelines for milking times for cows of different production levels

Average milk yield at a single milking:	Time in which 80% of cows should have completed milking
10 L/milking	6.3 minutes
12 L/milking	7.2 minutes
14 L/milking	8.0 minutes
16 L/milking	8.8 minutes
18 L/milking	9.5 minutes
20 L/milking	10.2 minutes



See [Technote 6](#) for more on assessing milking machine function



Monthly Checks - Carried out by herd manager or owner

Check effective reserve and regulator function	
Check for perished rubberware	
Check for increase in liner squawks and slips	
Check completeness of milking and milking times	

6.2 Call a milking machine technician if you observe any abnormalities in the milking machine during your daily, weekly or monthly checks.

Your Dairy Assessor or milk quality specialist can provide details of certified machine testers in your area. A full list of current technicians, certified by the NZ Milking and Pumping Trade Association (NZMPTA) can be found at www.nzmpta.co.nz.

A machine tester can undertake the following:

- Ensure that vacuum levels and airflows are appropriate for the machine
- Check that the pulsators are working correctly
- Service faulty pulsators
- Help correct all faults promptly.

You should receive a full report from your milking machine technician at the end of the visit. Vacuum recordings made during milking can be helpful to pinpoint some machine faults. A registered milking machine technician can also conduct other tests at milking time to help rectify problems.



Machine testing

SmartSMM recommends that every milking installation is serviced twice per year



See [Guideline 25](#) for more on tests that a certified milking machine technician can perform.

6.3 Change liners at regular intervals.

Teat cup liners are designed to flex and squeeze the teat during each pulsation cycle. This is essential to massage the teat and maintain its blood supply. When fitted into a correctly matched teat cup, the liner should be stretched 5-16% more than its original length.

As soon as they start work, liners begin to lose tension, absorb fat and hold bacteria. Once they have been used for too many cow milkings, the deterioration is sufficient to reduce the speed and completeness of milking, increase teat end damage, and increase spread of mastitis bacteria.

The effective life of liners is influenced by:

- The characteristics of the materials they are made from
- The conditions of storage, cleaning and use they experience
- Their exposure to sun, heat, chemicals and ozone.

Most manufacturers recommend that rubber liners are used for 2,500 cow milkings or 5 months, and then changed. The recommended life for silicone liners is 5,000 cow-milkings.



See [SmartSMM Liner Ready Reckoner](#) for estimating the number of days for 2,500 cow milkings.