



## Key Points:

- Build monitoring into your daily routine.
- Monitor the physical farm, milking equipment and herd.
- Monitor AMS performance through system reports.

# Monitoring large herd automatic milking systems

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**The key to a smooth-operating automatic milking system (AMS) is to build monitoring into your daily routine. This is even more important with a large herd.**

An AMS involves two types of monitoring: reviewing the reports generated by the herd management system and physically monitoring the equipment at the dairy, the farm (paddocks, laneways) and the cows.



*Physical monitoring is covered in the Info Sheet: Maintenance for large herd automatic milking systems. This Info Sheet covers routine monitoring of reports generated from the AMS software.*

## Monitoring cows for mastitis

Monitoring cows for indicators of mastitis risk allows you to maintain the higher quality milk and achieve premium payments for milk quality. It also improves animal well-being and productivity.

All AMS brands come with some tools for monitoring indicators of mastitis risk. Different AMS Manufacturers provide alerts in different formats and incorporate different parameters based on the milk from individual quarters. Depending on the brand, the parameters include some or all of the following: electrical conductivity, milk colour, milk flow rates, yield (compared with expected yields) and somatic cell count.

Most systems measure and track the electrical conductivity (EC) of milk from each quarter. The herd management reports generated give an indication of the cows and quarters that are most likely to have sub-clinical or clinical mastitis (usually reflected by an increase in milk conductivity). It is up to the operator to use these reports to identify cows that require visual assessment. Some AMS systems allow the operator to modify the factory threshold settings that influence the sensitivity of alerts. Some also allow you to modify the sensitivity of auto-discard options to prevent lower quality milk entering the vat.

As you gain experience with the automatic milking equipment, the software and the data for individual cows, you will become familiar of the optimum thresholds which should trigger action by

you or your staff, e.g. for alerts to inspect and/or treat cows with high conductivity or other parameters. If you are diligent in using the data/alerts you may find that a very high proportion of cows that exceed certain thresholds for more than one day are highly likely to have clinical mastitis.

With time, some AMS farmers who are very diligent in using their data/alerts also develop the confidence to start treating cows as subclinical mastitis cases. They claim that treating mastitis at the subclinical stage achieves an extremely high cure rate, very low frequency of repeat infections and a very low prevalence of clinical mastitis in the herd. This results in lower annual mastitis treatment costs, less milk discarded and less production losses from mastitis. The overall outcome is the collection and storage of high quality bulk milk with quality bonus payments.

Achieving this requires the operator to monitor the reports daily and set up strict procedures and routines. It also helps to have a good dairy yard layout that allows cows to be drafted to a holding pen for inspection prior to milking. This ensures that the milk is not sent to the vat and that the operator can milk and treat the cow with the hospital herd at its next milking session.



*Above: AMS reports can alert you to cows at risk of mastitis and draft them so they can be checked and treated if needed.*

## Standard operating procedure

Develop a standard operating procedure (SOP) for alert cows so that all staff are aware of what needs to be done. These might include:

- Visual inspection of the quarter and milk from that quarter.
- Routine stripping of the quarter.
- Keeping a clipboard of which cows are inspected each day so that different operators are aware of the previous day's inspections/outcomes.

Not all cows that appear on an alert list will require inspection. Assess the supporting data; for example, was the cow incomplete on that quarter at the previous milking? Or has the cow had an excessively short or long milking interval? Incomplete milkings and very short or long milking intervals can increase conductivity levels.

## Mastitis outbreak

Dealing with a mastitis outbreak with any automatic milking system is extremely challenging and disheartening; even more so with a large herd. Prevention is far easier than dealing with an outbreak so it's worth developing a rigorous monitoring routine and following best management practices.

## Incomplete milkings

With any AMS it is essential to monitor the number of incomplete milkings. These are usually caused by either unsuccessful cup attachment or premature cup removal.

Monitoring incomplete milkings will alert you to cows that need attention to ensure all quarters are milked at regular intervals. Without this intervention, incomplete cows or quarters may go unmilked for extended periods which can severely affect production and udder health. Take the time to assist cows to have successful milkings. It will result in production benefits and reduce the risk of cows developing behavioural issues associated with unpleasant experiences in the dairy.

An AMS report should alert the operator to cows that have a higher than acceptable level of incomplete milkings. To resolve the problem you will need to find out the cause of the incomplete milkings. Some insight may be gained by reviewing the cow's data on the system but you will most likely need to do a visual inspection of the individual cow and watch the milking process to identify the cause of the incomplete milking.

*Above: Taking the time to assist cows to have successful milkings will result in production benefits.*



The main 'cow' causes of unsuccessful cup attachment include unsettled cow behaviour, hairy or dirty udders, tail interference, a swollen udder and udder conformation (e.g. very close rear teats or open front teats).

Cows that are required for inspection or observation should be drafted prior to milking and held aside for an observed milking. Manually bring the drafted cows into the waiting yard and observe the ensuing milking.

Regardless of the cause, you need a protocol for inspecting these cows to ensure that they can be assisted to achieve regular successful milkings. This will minimise the incidence of the cow being sent back to the waiting yard for a second attempt, and will minimise the on-going need for operator assistance with the given cow.

## Udder and tail hair

Before cows enter the milking platform/box, check their udders and tails. If necessary clean them up by singeing the udder and/or trimming the tail hair.

*Below: Singe udder hair to prevent incomplete milkings.*



## Swollen udder

If the cow is in early lactation excessive swelling and oedema could affect cup attachment. In this case, consider milking her manually for a number of days. Allowing the robot to continually attempt automatic cup attachment may create a level of discomfort/agitation that encourages poor cow behaviour which can create on-going attachment issues even when the swelling is reduced and attached is expected to be possible. Also, regular milk removal will help to alleviate the swelling and thereby reduce the challenge of cup attachment.

## Udder conformation

If the robots cannot find the teats due to poor udder conformation consider options to minimise the problem. For example there may be one very low yielding quarter which can be dried off for the remainder of the lactation. If this is the case, do not administer any dry cow therapy to this teat in case the robot inadvertently puts a milking cup on it at future milkings. The risk associated with getting dry cow antibiotics in the vat cannot be eliminated. If the cow is in late lactation and her 7-day average yield has dropped below 10 litres consider putting her on extended milking intervals or drying her off.

You may find that for some reason the robot is searching for the teats in the wrong region (too high, too low, too far forward etc). In this case, the robot may need to be 're-taught' if it is using teat co-ordinates for teat searching.

In a very small number of cases poor udder conformation may mean a cow is not suited to automatic milking. This could be due to particularly short teats, teats too close together, teats on angles greater than 45 degrees or teats that do not extend far below the

plane of the lobes of the quarter. These cows are best removed from the automatic milking herd (culled or transferred to a conventional milking herd). In an AMS, it is not worth persevering with even one or two cows with unsuitable udder conformation. They will require excessive time and effort and the reduced attachment success can often lead to an increased incidence of mastitis. These cows often associate the milking process with negative experiences and become less willing to traffic to and through the dairy resulting in reduced milking frequency and eventually a decline in milk production, thereby further reducing their value in the herd. Through their own negative experiences and reluctance to traffic, these cows can start have a negative influence on their herd mates as well.

### Unsettled cow behaviour

The best way to avoid unsettled cow behaviour is to take the time to train heifers and monitor/assist their first few milkings in the AMS. For more information, refer to Info Sheet Raising cows for automatic milking.

### Premature cup removal

Incomplete milkings may be caused by cows kicking off the cups or by the system prematurely removing a milking cup(s) due to no or low milk flow. An increased level of kick-offs can be an indication of pain or discomfort. If a cow has an increased number of kick-offs, have her drafted so you can inspect her for causes of pain such as mastitis, a damaged teat, lameness or even a retained foetal membrane.

If the cow is unwell and in a level of discomfort, the increased incidence of kick-offs will often be accompanied by a low milking frequency and possibly higher than acceptable waiting times at the yard.

If premature cup removal is caused by little or no milk flow, the cause may also be due to mastitis or a naturally slow milking quarter. To prevent premature cup removal in these cows, you can either extend the pre-milking time or reduce the low milk flow threshold for the individual.

In some cases, cow discomfort may be caused by high vacuum levels, faulty pulsation systems and wrong take-off settings; particularly towards the end of the milking when milk flow drops. If this is the case, contact your local technician to inspect the equipment.

### False alarm

A cow is flagged as incomplete when the milk harvested on an individual quarter is below a set volume (often 75%) of the expected yield for that quarter or the total yield for the milking is below a settable threshold (also often 75%). Sometimes the software will indicate that a cow has been incompletely milked when in fact no more milk can be harvested. There are a number of reasons why this may occur.

- During oestrus some cows 'hold their milk.' If this happens the cow can be released to a fresh pasture allocation or drafted for A.I. Her next yield should be more closely matched with her expected yield.
- The system may flag a cow as incomplete when she has in fact completely milked out. This can occur if the expected yield is higher than the actual yield of milk harvested.
- If one quarter is not milked at a given milking session, the system can be set to direct the cow back to the waiting yard for a second attempt. Sometimes the cow is completely milked but two quarters could be milked by one milking cup resulting in erroneous quarter yields. This may affect expected quarter yields at subsequent milkings but they will realign themselves relatively quickly.

- If the total yield from the cow is considerably lower than her expected yield (but the cow is completely milked) resist the temptation to enter a manual milk yield to boost her yield and align it with the expected yield. This will likely result in a bigger issue at the next milking. Instead, allow the cow's actual and expected yields to gradually realign.

Check the threshold setting that is used by the software to determine which quarter is incomplete. Many farmers set the limit at 75% of expected yield. So for example, if a quarter has an expected yield of 4 kg milk at any particular milking, it will be flagged as incomplete if less than 3kg of milk is harvested from that quarter.

### Cow activity

If you have activity monitoring devices on your cows take the time to become very familiar with their potential. Talk to other AMS farmers who have the same brand to find out how they use them and what you can realistically expect in terms of accuracy and the reporting system. FutureDairy recommends continuing to use conventional heat detection aids and visual observation, at least until you are very familiar with activity monitors. You may find that the activity monitors alert you to some cows that don't appear to be on heat.

Over time you will develop the confidence to assess these cows and decide whether they have had a weak heat event and can be inseminated regardless. You may find that some cows do not appear on the alert list when they are on heat. Diligent visual heat detection will enable you to develop an understanding of the proportion of cows that are missed by the system. Over time you may grow to trust the system enough that you don't feel the need to continue with visual heat detection. Extra vigilance is needed in seasonal calving systems where a 90% submission rate is regarded as best practice.

Be sure to record all oestrus events and insemination dates in the AMS management program so that you maintain accurate records. It is these records that you will use to determine when individual cows should be drafted for anoestrus treatment/vet check, pregnancy testing, drying off, or drafting into a springer group. Optimal timing of these events/activities will help you to manage an efficient operation.



### Monitoring milk production

Most farmers monitor milk production, regardless of whether they have an automatic or conventional milking system. However an AMS gives you the ability to monitor milk production by individual quarters.

Be mindful that daily production data will depend on the exact timing of each milking event. If a cow milks herself just after midnight, around lunchtime and again just before midnight she will have had three milkings for that day. If 10L are harvested per milking, this will equate to a daily milk production of 30L.

The same cow may drop to 20L and just one milking the following day if she milks at around lunchtime and again just after midnight. It is therefore more useful to monitor 7-day average yields (particularly when monitoring herd production levels).

Remember that any management changes you implement will take a few days to have any significant effect on a 7-day yield.

Use an alert report to determine cows that have experienced a significant drop in production - either in an individual quarter or at the whole cow level. Set these cows to be drafted for visual assessment next time they visit the dairy. If there is a quarter that has dropped in production, assess the milk from that quarter to determine if she has mastitis.

In some cases a vet check may be needed. Before consulting a vet, first conduct some basic checks:

- Do a visual health observation of the cow.
- Is the robot struggling to attach cups due to hairy udder, or searching in the wrong place?
- Review cow card and records to see if she is eating her grain based concentrate.
- Are her waiting times and milking intervals increasing?

## Milking frequency

Review the reports from your system to monitor whether your target milking frequencies are being achieved. Pay particular attention to cows with extremely long milking intervals as it could reduce milk production and compromise udder health. Early lactation cows should be highly motivated to move around the farm and to be milked. Be on alert for early lactation cows that do not achieve high a milking frequency (especially if it is less than once a day). Some cows do have a natural affinity to milk at a low frequency with high milk yield per milking. This is fine as long as grain allocation is monitored, and the cow is not receiving too much concentrate in one feed.

Dramatic drops in milking frequency in an individual cow can be indication of illness or lameness. If the low milking frequency lasts more than a couple of days it is worth having a vet check the cow, even if you can't detect an immediate problem.

A widespread drop in milking frequency across the herd is likely to be associated with feed allocation. It is likely that you are allocating too much feed in at least one of the daily allocations. Often it is not immediately obvious which allocation is too big as the problem creates a negative spiral.

If cows are slow to move out of one allocation they will be late to gain access to the next and it is likely that a smaller proportion of the herd will actually gain access to the second allocation. In addition the low milking frequency could mean concentrate volumes are increased 'per feed'.

If cows are on high levels of concentrate this could indicate an increased risk of acidosis. Ensure the settings on the cows' daily feed allocation are capped 'per feed'.

The cows that do gain access to it will struggle to deplete it in a timely manner and will be later to walk out, and so it goes on. Consider severely reducing one allocation to get cows back on track.

## Concentrate intake



Likewise, a dramatic drop in the consumption of allocated grain-based-concentrate can be the earliest indication that a cow is suffering from a displaced abomasum or some other illness. Early inspection and intervention can result in very successful treatment and recovery.

A more widespread drop in concentrate consumption may indicate technical issues with the feed system. You will probably detect this through the change in cow behaviour before you detect a change on feed consumption level.

*Left: a dramatic drop in the consumption of allocated grain-based-concentrate can be the earliest indication that a cow is suffering from a displaced abomasum or some other illness. Early inspection and intervention can result in very successful treatment and recovery.*

## Monitoring system performance

All automatic milking systems should be managed with strict monitoring, cleaning and preventative maintenance systems and routines in place. The equipment is a significant investment and diligent cleaning and maintenance will enable you to achieve high milk harvesting efficiency and prevent breakdowns through early detection of worn or loose parts. Don't ignore the warning signs. The additional wear and tear on other components is likely to cost more in the long run.

### Box robots

Keep any eye on daily reports for any trends that are associated with one robot e.g. increased incidence of not attached cups that are associated with just one robot (e.g. more than normal on rear teats or front teats), or an increase in the average milking times (due to extended time to find and attach individual cups).

Don't assume that a lower throughput/milk volume harvested on a particular box robot is because cows choose not to use that robot so much. For example, a robot may be 'less popular' than others because it is at the far end of the yard. Consider using this robot for training fresh heifers etc. Heifers trained in the robot will be more inclined to use it in the future which may even out the demand across the boxes.

If you have a robot that is truly 'under-performing' take the time to watch it in action. You may quickly determine a problem that you or your technician can fix promptly. Having all of the robotic units working to optimum performance ensures you get the best out of your investment. It will also have a positive impact on the cows. The more likely they are to be milked completely on the first attempt (without lots of cup attaching and reattaching), the more willing they will be to come to the dairy in the future and to stand calmly for the cup attachment process.

## Robotic rotary

If you have a robotic rotary, check reports for any automatic milking points that are associated with a high level of incomplete milkings or kick-offs as this can indicate a bail specific problem. If necessary the offending bail can be deactivated until the problem is rectified.

Take the time to watch a cow at the milking point to see if you can easily detect the problem. Look for:

- Milk hoses that have become dirty/soiled, making it difficult for the robots to take them under the cow.
- Cup removal cord/s that have lost tension or snapped, and affect the cup positions.
- Dirt or obstructions blocking the milk meter resulting in erroneous milk yields.

If you can't detect the problem, contact your service technician.

### FOR MORE INFORMATION

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## Automatic drafting gates

Gate problems can be frustrating for operators and cows to deal with, especially at night (in the dark). Daily reports can show signs of potential gate malfunction.

Monitor reports for:

- An increase in the number of idle alarms. This usually indicates a gate is not allowing cows to pass through a certain area of the dairy.
- Higher than normal levels of failed gate passings, other alerts or communication errors between the main system and a certain gate.

These usually indicate that the ID reader, a photo cell or sensor or ram is directly faulty or misaligned. Fix this promptly to avoid cows becoming frustrated or having a negative experience with the gates.

Prompt attention is needed for any automatic drafting gates that leak air. Although small air leak may not have too much impact on cow traffic or gate function, the problem is likely to get worse, and even if it doesn't, there will be an increase in the number of times the air compressor switches on and off which can have a big impact on electricity consumption.

*Below: Problems with automatic drafting gates are inconvenient, especially at night. Use daily reports to identify signs of gate malfunction.*



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