



Key Points:

- Feed is the most reliable incentive for encouraging voluntary cow traffic
- Larger herds/farms will generally result in longer walking distances
- Feed quality will impact on cow traffic
- Consider how best to cope with fluctuating herd sizes

Managing incentives in large herd automatic milking systems

By Kendra Kerrisk and Lee-Ann Monks

Feed is the primary motivator used to encourage voluntary cow movement in an automatic milking system (AMS). Cows with stronger appetites (eg high producing cows or those in early lactation) are more motivated to move around the farm. This Info Sheet is relevant to automatic milking systems (AMS) based on voluntary milking. It is not relevant for batch milking AMS.

Principles of voluntary cow movement

A successful AMS relies on achieving milkings that are relatively evenly spread across the 24 hours (distributed milking) in a day, with cows moving by themselves to be milked and around the farm (voluntary cow movement). Aim for a low number of cows that require fetching so that fetched cows do not have to queue at the dairy for more than an hour. The larger the group, the longer the last cow will have to wait for milking, but also, research has shown that fetched cows are significantly slower to move through the dairy than cows that arrive at the dairy voluntarily. There is also the possibility that fetched cows are more likely to disrupt the flow of voluntary cows through the dairy.

FutureDairy research has shown that the two most important management practices for encouraging voluntary cow movement are accurate pasture/feed allocation and offering three fresh feed allocations a day (compared with conventional milking farms which typically offer two fresh allocations of feed a day). Cows are fully fed over a 24 hour period, however they receive their daily allocation in several smaller portions. As they deplete one allocation, they start walking in search of the next allocation. They go via the dairy and are milked before being released to the next allocation if they have milking permission.

 [Info sheet: Voluntary cow movement](#)

 [Farmer story: van Adrichem](#)

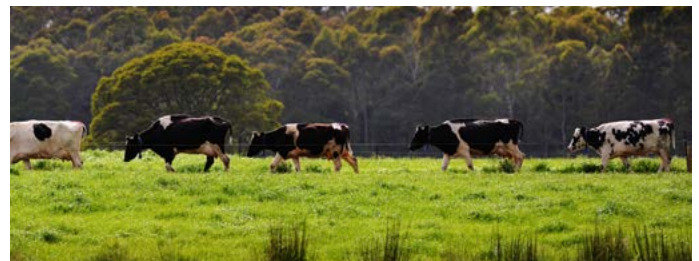
 [Farmer story: Greg Dennis](#)



The principles of using feed to encourage voluntary cow movement are the same, regardless of the herd size. These principles are covered in detail in FutureDairy AMS Guidelines for pasture based AMS farms p 8-23 & 35-38

However a large herd automatic milking system presents some additional challenges for managing voluntary cow movement:

- Longer walking distances.
- Feed quality.
- Fluctuating cow numbers.
- Drafting cows.
- Switching between batch and voluntary milking.



Above: As cows deplete one of their daily feed allocations, they walk around the farm in search of the next, going via the dairy if they are ready to be milked again.

Walking distances

A large herd usually means longer walking distances. A bigger herd requires bigger paddocks which means a longer distance to those furthest from the dairy, unless the feeding system is intensified (i.e. more supplementary feed per cow per year). The most obvious effect of this is that it takes cows longer to walk back to the dairy from the furthest paddocks. This also has an

effect on cows' motivation to walk voluntarily around the farm. FutureDairy research has shown that voluntary cow movement starts to decrease if cows have to walk more than 800m to their grazing paddock. There is no known distance which is the limit to which cows will walk without human encouragement. Flat farms are better for encouraging voluntary cow movement.

Consider the following practices when grazing paddocks further than 800m from the dairy.

- If possible compensate for long walking distances by making the next allocation closer to the dairy. This will help maintain the desired milking frequency and also reduce the energy expenditure put towards walking on any given day.
- If growing forage crops that are intended for harvest – grow these on the furthest areas of the farm, as they will be cut and carried to the cows (e.g. at a feedpad or in a paddock).
- If you are growing grazeable crops that will boost your feed grown per hectare, grow them relatively close to the dairy as cows will probably spend a disproportionate number of days grazing these across an annual cycle.
- Graze far away paddocks at night so that cows are walking out of them during the day. They will happily walk to the far away paddock but may be slower or more reluctant to return to the dairy when the grass is depleted. If they are leaving the paddock during the day you can keep an eye on cow movement and encourage the cows to the dairy in mobs if they are not moving well. It is much less convenient to do this at night.
- Avoid paddocks that are far away if their topography adds an extra challenge to voluntary cow movement.



Caption: Grow grazeable crops close to the dairy as cows will probably spend more days grazing there.

Feed quality

Poor feed quality can have a negative effect on voluntary cow movement, and this effect will be stronger if there's a long walking distance. Of course on any dairy farm, poor quality feed will also affect milk production.

If you have difficulty getting cows to walk to poor quality pasture or crops, you may need to find alternative ways to use the feed, for example using it for young or dry stock.

Fluctuating cow numbers

There may be times when you have a very small number of cows in the voluntary milking herd and other times when the numbers will peak. These 'peak and trough' times present some challenges for managing voluntary cow movement. For example, seasonal calving herds will have 'peaks and troughs' each season and there may be similar challenges for herds in the early stages of an expansion phase.

Seasonal calving herds

With seasonal calving herds, there will be a brief period at the start of the season, when the voluntary milking herd (the earliest calvers) is very small. To achieve voluntary cow movement, the daily feed allocation for this small group needs to be split into three allocations. This is challenging if you are only feeding a small number of cows. For example, the daily pasture requirement of 50 cows needing 20 kg DM/cow/day is just one tonne of pasture dry matter (DM) per day or about 350 kg DM per allocation. Unless pasture covers are very low and paddocks are very small you will probably need to use temporary electric fencing to achieve multiple grazings in each paddock. Try to minimise backgrazing as it has a negative effect on both cow traffic and pasture regrowth. If you find it extremely challenging to manage the pasture allocations with a very small herd you could consider 2-way grazing for a short time. Alternatively it may be necessary to consider batch milking the herd until the numbers become more manageable. Try to minimise this though as it will take cows some time to adjust back to voluntary cow traffic.

Another challenge that may arise with seasonal calving is the quality of feed that is available to the cows in very early lactation. It can be difficult to achieve good cow traffic and high milking frequencies if the pasture quality is lacking, which may be the case with deferred grazing of autumn pastures.

Scaling up

Some farmers commission an AMS with a relatively small herd size that will be scaled up over time. In the early years, you will need to manage an understocked feed source/farm. How big are the paddocks? How many grazings will you get out of a paddock? How will you minimise back grazing? If your paddocks are too big for the small herd you will find it challenging to accurately provide the daily allocations split into three paddocks and it will be harder to prevent backgrazing.

One option is to use only a proportion of the farm and allocate the rest for young stock, dry stock or to be used as a 'feed factory' with conserved forages for sale.

Capacity and congestion

In a seasonal calving herd, the demand for robotic milking capacity (system utilisation) is at its greatest at the peak of season – when the most number of cows are in milk, and you will probably be aiming for the high production cows to be milked more often than twice a day (with AMS, it is quite common for high producing cows to be milked up to 2.5 times a day at their peak).

This is also the time when there is most potential for congestion at the dairy. Congestion can lead to two complications. Firstly cows may spend more time on concrete and away from feed. And secondly the most subordinate cows may struggle to hold their place in a queue (for milking or supplementary feed) resulting in them being significantly disadvantaged.

The key to managing congestion is to observe and understand cow behaviour and how cows respond to different management practices.

For example, cows that loiter at the dairy for an extended period before a fresh pasture allocation opens are telling you that there was not enough pasture in the previous allocation.

Likewise cows that are slow to leave a pasture allocation and walk to the dairy are telling you that there was too much feed in an allocation. It may not be that particular allocation of feed that was too big but somewhere along the way, cows were slow to move from a given allocation which delayed the timing of them accessing subsequent allocations thereby extending the time it takes them to deplete to the feed source than you expected.



Above: Congestion at the dairy means cows spend more time on concrete and away from feed. It can also disadvantage the subordinate cows as they may struggle to hold their place in queues for milking or supplementary feed.

Trouble shooting

The best tactic to dealing with cow behaviour problems is to take a trouble-shooting approach. Focus on fixing the cause rather than finding a 'band-aid' solution to the problem.

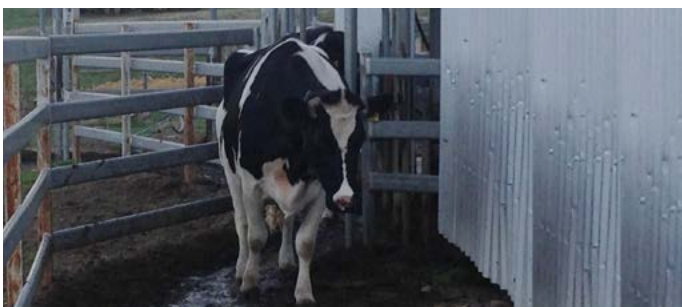
Without prompt attention, a behaviour can develop into a habit which is more difficult to break. For example, cows will learn that if they hang around the feeders they will likely get a new allocation after a certain time. So they will start to loiter and camp there. If you need to prevent this behaviour extend the 'no-feeding' interval from 1 to 3 hours.

Cows that are fetched to the dairy will not have the same level of motivation to move through the facility as those that have walked there voluntarily. The fetched cows have not developed the appetite to motivate them to move. These fetched cows can create congestion particularly if they prevent other cows from gaining access to the milk harvesting facility. The potential for this is increased with the robotic rotary since all cows are competing for the single entry point onto the platform so an individual cow has the potential to block a number of cows from entering the platform.

Drafting cows

All automatic milking systems need good facilities to draft cows for treatment, observation or intervention. AMS farmers often set their system to draft selected cows throughout an entire night for a procedure the next morning such as vet checks.

Drafting through the night can create the risk of undesirably long milking intervals which reduces the milk accumulation rate in the udder and increases the risk of mastitis. It is preferable if the drafting system is designed to allow drafted cows to re-access the dairy before being drafted again. If you draft all night, the cow that is drafted at 8pm might like to milk herself again at 4am. Then she is only four hours since milking when the vet comes at 8am rather than 12 hours. However if the cow is being drafted for a mastitis check you may want to disable her milking permission until she has been examined.



Above: Design your drafting system to allow cows to re-access the dairy from the holding area. This will avoid undesirably long intervals between milking.

Moving from batch to voluntary milking

Some farmers may choose to batch milk initially as a stepping stone to voluntary milking. Large herd managers may find the logistics easier to batch milk colostrum and hospital/treatment cows, especially if they have a separate milking facility for these cows.

However, if the cows become adjusted to the new dairy layout, the farm infrastructure and the milk harvesting equipment, there is nothing significant that can change to indicate to them that their routines and behavior should be modified. In this case it can take time to break the established habits that go with batch milking.

If shifting from batch milking to voluntary, additional laneways and drafting gates may be needed as voluntary cow movement is most successful if the farm layout is set up for 3-way grazing.

In a seasonal calving herd, a farmer may choose to batch milk for a short period at the start of calving while the milking herd size is increasing in numbers. Generally it would be expected that the transition to voluntary milking in this scenario should be relatively trouble-free since most of the cows will be familiar with voluntary cow traffic and they will have high levels of motivation (being in early lactation).

Beware! If you batch milk for a long period the cows may take several months to adjust back to voluntary movement.

Moving from voluntary to batch milking

Farmers may choose to move cows in late lactation from the voluntary milking herd to a separate group which is milked as a batch once-a-day. While FutureDairy has not yet explored this idea, it could have a significant positive impact on the remainder of the herd.

This approach removes the least motivated (late lactation) cows from the voluntary milking herd. Any high producing late lactation cows could remain in the voluntary milking herd as their motivation levels are probably still reasonably good.

The low producing, late lactation cows could still be auto milked but fetched to the dairy for set milking sessions. They could be managed so that they cannot hold up other cows. They wouldn't have a negative impact on other cows with regards to timing of leaving pasture allocations and their own milk production might stabilize if they have regular milking intervals with less incomplete milkings as a result of having more consistent udder conformation.

FOR MORE INFORMATION

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