



Management Guidelines

**for
Pasture-based
AMS farms**

2010



AMS Research Farm ● Camden ● NSW



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**Management guidelines for pasture-based
AMS farms**

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Management Guidelines for Pasture-based AMS farms 2010

These guidelines are designed to give you a sense of what is involved in managing a pasture-based AMS.

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Foreword

It may be decades ago, but I can still remember the difference it made when we upgraded our dairy from walk-thru to herringbone, and again when we built a rotary dairy.

The efficiency gains were the main reason for the change, but the added benefits of reduced stress and improved lifestyle were just as valuable to our family and staff.

Today we are on the brink of an exciting new era with automatic milking systems (AMS) starting to take off in Australia.

I'm proud to be involved with the FutureDairy team which has clearly demonstrated that robotic technology can be adapted successfully to Australian pasture-based grazing systems.

The independent research conducted by Kendra Kerrisk and her team at the Elizabeth Macarthur Agricultural Institute at Camden has shown that an AMS operating under commercial conditions can achieve efficient pasture utilisation, which we all know is crucial to our on-going profitability.

While AMS has the potential to dramatically improve labour and lifestyle on dairy farms, it does involve some changes to the management system.

As a dairy farmer, I highly recommend these Management Guidelines as essential reading to anyone seriously contemplating the installation of an automated system.

They provide the practical information needed to adapt a dairy management system to suit an AMS.

We can be confident that following the Guidelines will work as they are based on both scientific research and experience under commercial conditions.

As a levy payer, these Guidelines represent a very tangible and practical outcome from our investment through Dairy Australia. Our value for money has been enhanced through key co-investment from DeLaval, the University of Sydney and Industry and Investment, NSW (formerly DPI).

Automatic milking won't suit every Australian dairy farmer, but these Guidelines will help those who choose the AMS path to make it a success.

I look forward to seeing the technology and associated management system roll out in the coming years.



Shirley Harlock,
Dairy farmer,
Warrnambool, Victoria
Chair, FutureDairy Research Project

Glossary

Before you begin getting into the detail about automatic milking systems, familiarise yourself with the following terms as even common words can have slightly different meanings in this context.

Active access time

The time available to cows to enter a break and start eating.

Automatic feeders

Individual concentrate feeding stations that deliver measured amounts to individual cows (based on electronic ID). Generally used to increase the amount of concentrate fed to individuals when time spent in milking units limits daily consumption levels.

Automatic milking systems (AMS)

A generic term used to refer to automated systems that complete the whole milking process without the direct assistance of milking staff.

Conventional milking

Any system (regardless of level of automation) that requires staff to be present during the milking of a herd.

Cow traffic

Refers to the movement of cows around the farm that occurs without human encouragement.

Distributed milking pattern

The pattern of milkings scattered throughout a 24-hour period. Can be used to check if there are periods when milking units are being under-utilised.

Fetching

The action of actively encouraging cows to move to the dairy. Fetching may involve simply encouraging cows from the paddock to the laneway and allowing them to make their way to the dairy at their own pace. This type of fetching activity is not time consuming and is usually undertaken in conjunction with other paddock tasks like moving fences etc. Fetching can also mean times when you need to walk individuals or small groups of cows all the way to the dairy for mating/herd health procedures.

Machine utilisation

Number of milkings per unit, sometimes measured as litres harvested per machine per day. Idle time per machine per day is also used as an indicator of machine utilisation.

Milking frequency

Number of times a cow is milked per day. Helps decide if the herd is on track to achieve production targets. Farmer can set machine to allow/deny milking for individual cows based on factors like stage of lactation or production level.

Glossary continued

Milking interval

Numbers of hours between milkings for each individual cow. Not necessarily a whole number and will vary from day to day and between cows. Interval too long – drop in production, increase risk of mastitis. Interval too short – milk yield too low and potential for poor attachment with flaccid udder and low milk harvesting rate (yield per minute).

Milking unit

Individual crates where milk is harvested from cows. Often referred to as the milking station, robot or the AMS.

One-way gates

Gates that cows push through to enter a defined area but prevent a cow from moving back to the area from which they have just come.

Pasture break

Paddock or part of a paddock containing pasture. Often comprised of a combination of permanent and temporary electric fences.

Pasture allocation

Defined volume or area of pasture (generally measured as kilograms of dry matter – kg DM).

Robotic milking systems RMS

A brand/product name of an AMS, sometimes used interchangeably with the term AMS.

Sorting/holding/drafting yard

An area cows are automatically sent to (generally after milking) for treatments, inspection or attention. Terms are often used interchangeably.

Visitation, visitation patterns

The frequency and timing of cow visits to the dairy. This information is captured by the software and can be used to identify cows failing to meet milking frequency targets or to monitor machine utilisation.

Voluntary cow movement

The movement of cows around the farm system that occurs without human encouragement.

Voluntary milking system VMS

A brand/product name of an AMS, sometimes used interchangeably with the term AMS.

Voluntary movement time

The time available for cows to voluntarily move out of a depleted break.

Section One: The AMS Challenge

1

An AMS affects all the elements of a farm operation.
This section aims to help you develop a realistic picture of what to expect.



Section One: The AMS Challenge

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AMS – a whole new way of farming

An automatic milking system (AMS) has an impact on every aspect of your farm operation – not just milking time.

The change from needing labour at set milking times to a distributed pattern over 24 hours is a huge change in routine for farmers.

Only a small proportion of the 10,000 AMS installations worldwide have been unsuccessful to date. Failures are due mostly to unrealistic expectations of the technology and the impact that it will have on farm labour, lifestyle and business.

If you assume any of the following, then maybe an AMS is not for you.

If you think this...	Think again...
I will never have to be in the dairy again...	While an AMS does handle most routine tasks, you will still need to clean and maintain the dairy and carry out animal health checks/treatments.
I will never have to get the cows in again...	There will be the odd cow that needs fetching, but at least the system will alert you and she can be milked at your convenience.
I can get a job off-farm – an AMS manages itself...	Dream on! The farm still needs careful, hands-on management to be profitable.
My farm layout is great – it'll be easy...	Your layout might be great when you are in control but is it set up so cows can move around voluntarily?
It'll be up and running in no time...	It is a huge change for you, the staff and your cows. Allow at least 6 months for planning and a year to establish the new routines.

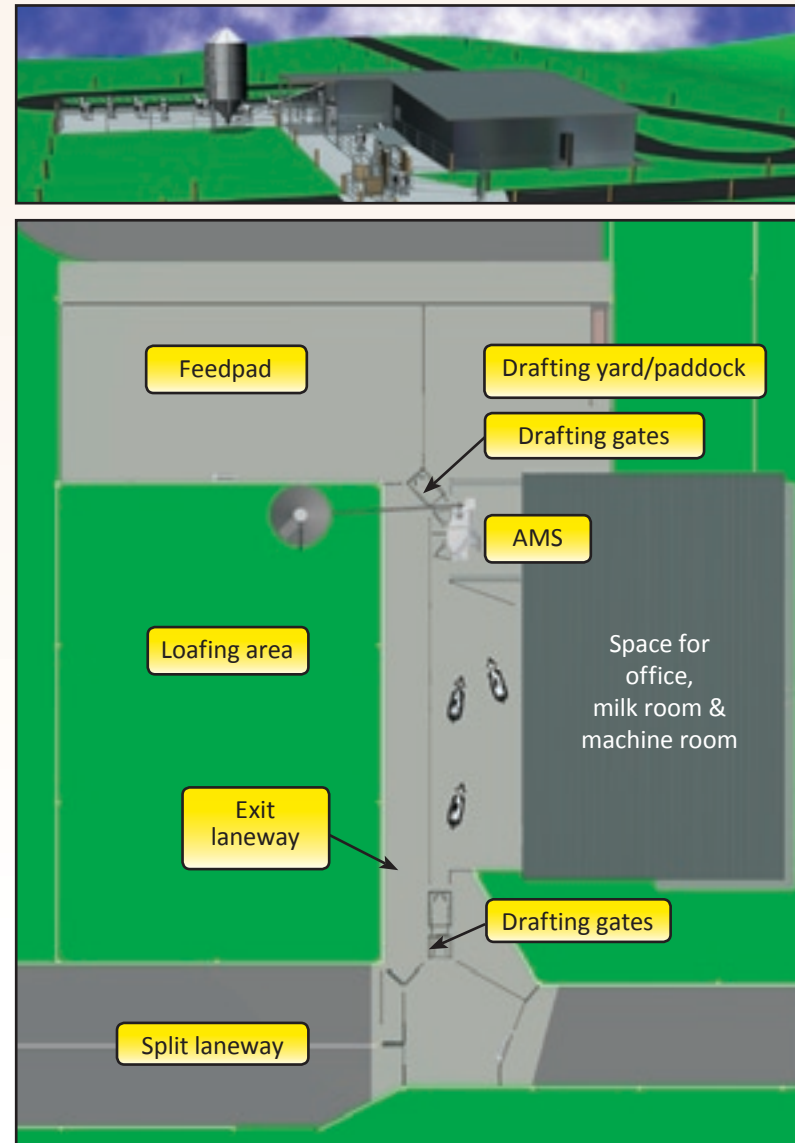
How does an automatic milking system work?

Cows move voluntarily around an AMS farm. The most effective motivator is feed.

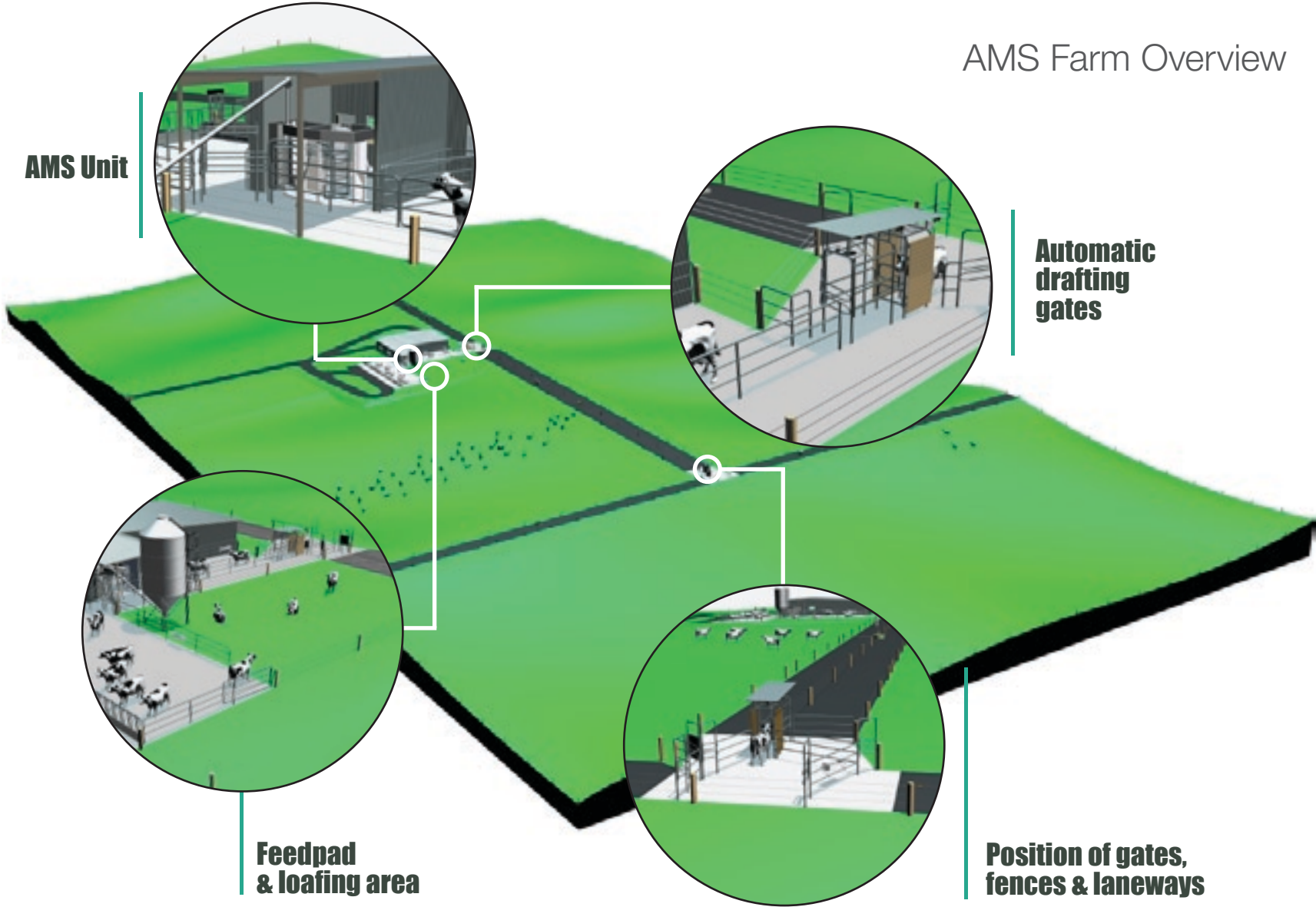
Allocating and allowing access to feed or loafing areas encourages cows to move around the system.

Careful layout/location of farm infrastructure assists good cow flow.

It is important to understand that the whole system relies on the cows' willingness to move around the farm. Cows can be encouraged to move in a number of ways but the most effective and reliable motivator is food!



AMS Farm Overview



Main differences between conventional systems and AMS

Many farmers new to AMS assume they will have lots of time on their hands. In reality, there is still plenty to do, however, the focus of physical and management tasks shifts.

1. Routines do not pivot on milking time anymore.

The main focus is now on the allocation and management of pasture/feed as the driver for cow movement.

2. The milking machine takes on a whole new role as the information and control centre.

Checking cow data relating to visitation rates, milk quality and yield and setting milking parameters all become part of a new daily routine.

3. The herd as a whole is less of a daily focus as individual cow management becomes easier.

Daily reports and alerts indicate which individual cows need follow up.

Experience from the Camden trial and another commercial farm, shows that the working day is shorter with an AMS (starting at 7.30-8.30 am and finishing between 4.00-5.00 pm). Not all farms will opt for reduced hours. Some may decide to reduce labour units to capture a financial benefit instead.

Key differences between conventional & automatic systems

	Conventional farm	AMS farm
Cow movement	Whole herd moved to dairy for milking.	Individual cows move themselves to milking.
Milking time	Set by farmer and dependent on farm labour.	Cows can access the milking unit at any time. Labour not required to be present.
Milking frequency	Usually twice a day.	Cows can be allowed to be milked more or less frequently to meet production targets and match stage of lactation.
Labour – key milking tasks	Labour needed for moving cows to dairy, teat preparation, cups on, cups off, teat spraying, drafting.	Labour needed to fetch the odd ‘no show’ cow – usually combined with other paddock jobs i.e. changing fences.
Labour – cleaning & maintenance	Labour needed for cleaning machines, vats, yards plus regular machine maintenance.	Labour needed for yard cleaning, plus regular machine maintenance.
Labour – breakdowns	Potential for breakdowns twice/day.	Potential for breakdowns anytime.
Labour – pasture management	Calculate feed requirements, assess pasture quality, allocate pasture/move fences, maintain feed pad.	Calculate feed requirements, assess pasture quality, allocate pasture/move fences, maintain feed pad.
Labour – computer work	May be limited if only paper records are kept.	Check alerts, set visitation rights, review daily performance.

Common misconceptions about AMS

There are a number of misconceptions and myths about automatic milking systems. If you subscribe to them then you may not manage the system in an optimal way.

Take a quick reality check:

If you think this...	Think again...
It is just a new way of milking cows...	AMS is a new way of farming. If you fail to re-think your approach to pasture/feed management for example you may end up with cows being milked more frequently but being underfed.
High levels of pasture utilisation can't be achieved with AMS...	<p>Some people think post grazing residuals can't be well managed if cows are not locked in and 'forced' to eat pasture down.</p> <p>The Camden system has clearly shown this is not the case.</p> <p>You can choose to redirect cows back to a paddock if feed is under-utilised – you are still in control and your cows are already trained to graze to the levels that you expect of them.</p>
If cows move around the system, they must be hungry which means they are not getting enough feed which means they must be underfed!	<p>Often farmers assume that unless cows are offered pasture in big breaks (i.e. morning and night paddocks), they will be underfed. Also, that offering smaller parcels of pasture is somehow less optimal than bigger areas and equates to underfeeding cows.</p> <p>In fact, smaller parcels of feed encourage the cow to move around the system looking for the 'fresh pick'. The same daily intake can be achieved as with a conventional approach.</p>

If you think this...	Think again...
Cows like to be milked and udder pressure/fill is enough of an incentive to get them to the dairy...	<p>From a cow's point of view, milking frequency and milking intervals are more likely to be determined by an interest in their stomachs rather than enjoyment of being milked by a machine!</p> <p>While it may be hard to accept that cows actually prefer access to feed and loafing over being milked, it is true.</p> <p>Don't underestimate the effort you should put into motivating cows to move through careful allocation and access to feed.</p>
Cows in late lactation cannot be enticed to the dairy...	This is true for some late lactation cows but if production is maintained then so is the appetite and the motivation to move around the system.
AMS makes for happy cows that will therefore produce lots of milk...	If cows have been subjected to lots of polypipe and nipping dogs then maybe the change to an AMS will have an impact on let down. Be clear however, that the quantity and quality of what you feed cows is the real driver of production.

First principles and keys to success

Realistic expectations start by understanding the key principles for the successful operation of an automatic milking system.

Farmers who are successful at AMS keep the following principles in mind.

- **Voluntary cow movement** – you need infrastructure and management strategies that encourage consistent and reliable cow traffic around the farm.
- **Accurate pasture allocation** – your pasture/feed management is the key to reliable cow movement. Cows are mostly motivated to move by the hope of accessing more feed.
- **A distributed milking pattern** – this refers to the milking units being used fairly evenly over a 24-hour period. You need to reap the benefit of your investment in milking units by ensuring utilisation rates are optimal.

In challenging practical situations or when you have decisions to make, remember these three principles and what the system needs to achieve overall.

Three key terms:

Milking frequency – number of times cow is milked per day. Helps decide if the herd is on track to achieve production targets. Farmer can set machine to allow/deny milking for individual cows based on stage of lactation etc.

Machine utilisation – number of milkings per unit. Sometimes measured as litres harvested per machine per day or as idle time per machine per day.

Milking interval – number of hours between milkings. Interval too long – drop in production, increase risk of mastitis. Interval too short – milk yield too low and potential for poor attachment with flaccid udder and low milk harvesting rate (yield per minute).

Voluntary cow movement

What drives cow movement?

Cows are highly motivated to move to access feed. You achieve good voluntary cow movement by setting up farm infrastructure in a way that makes it easy for cows to gain access to what they seek.

As an AMS farmer your most important management task is to plan and oversee cow access to these things and to set up and manage the system in a way that encourages a reliable and consistent pattern of cow movement.

Decision	Think about the impact...
Number of laneways to/from the dairy	Lessons from the Camden AMS research farm show that a farm layout with only one split laneway laneway direction extending to/from the dairy can work with AMS but additional laneways increase flexibility. This can improve cow traffic, milking frequency, machine utilisation and regularity of milking interval.

Cows like access to feed/water, loafing areas, shade, shelter, herd mates but the most reliable motivator for movement is access to fresh feed. Design and manage your system to optimise cow flow and cow traffic. Ensure that milking frequency is not impacted by the inability of cows to find their way around.

The more often the available feed source is depleted, the more cows will traffic around the system.

More frequent trafficking can result in increased milking frequency (if this is desired) and reduced variability around milking intervals.

There are a number of key decisions to make:

- How many pasture allocations per day do you require?
- Will you include a feed pad?
- If yes, will the feedpad have a loafing area with it?

Decision	Think about...
Number of pasture allocations	Offering cows two allocations of pasture per day is workable but there are times when offering three per day allows you to target periods of low machine utilisation. This provides an opportunity to increase the milking frequency for selected cows which may include early lactation cows or heifers.

Decision	Think about...
A feedpad – yes or no?	<p>Including a feedpad does provide additional flexibility and they are particularly useful during drought conditions.</p> <p>Your decision to include a feedpad will depend on how much supplement you plan to feed now and in the future. If you have a feedpad already, make sure it is integrated well.</p>

Depletion of feed on a feedpad can be quite abrupt and may cause a mass movement of cows. This could result in long queues at the dairy if not managed appropriately. Note that some motivated cows will leave prior to the feed becoming completely depleted due to a reduced willingness to eat feed that has been picked through by other cows.

Cows will leave a feedpad with a concrete floor to access a comfortable loafing area for rumination. You can direct the cows to a paddock to loaf or provide a loafing area next to your feedpad.

The important thing to remember is that feedpads can act as a break or can be used to supplement a break.

Decision	Think about the impact...
Associated loafing area – yes or no?	<p>No - you can use the feedpad to put out supplement. Cows will eat a bit then have to move to access a loafing area. The feed may not be depleted.</p> <p>Yes - Your feedpad can also act as an additional break/feed allocation where cows eat and loaf (and eat and loaf!) until the feed is depleted before moving off to the next pasture break.</p>

Feedpads and the location of comfortable loafing areas have an impact on how cows traffic around the system and also on their intake. The trick is to ensure allocations, no matter where they are located are consumed by the cows to maintain production.

Feedpads can act as a break or can supplement a break.

Assume you are trying to feed your cows 18 kg DM outside of the dairy. When you have lots of grass you may provide the cows with three breaks (each of 6 kg DM/cow) throughout the 24-hour period.

When you don't have enough grass you have to ask the question – how will I supplement the cows? If you have a feedpad you can put the supplementary feed there – rather than in the paddock.

Now you may choose to provide your cows with 12 kg grass and 6 kg supplement/day. There are two options depending on your set up:

Option 1.**Feedpad has a loafing area associated with it.**

You could provide the cows with two breaks of pasture during each day. Each break is 6 kg. Since your feedpad has a loafing area, the third break of grass is now replaced by an allocation of 6 kg on the feedpad - effectively three breaks of 6 kg (2 of pasture, 1 of supplement).

In this case, the feedpad is acting as a break and just like pasture breaks, the cows will be unlikely to leave this area prior to the feed being depleted.

Option 2.**No loafing area associated with the feedpad.**

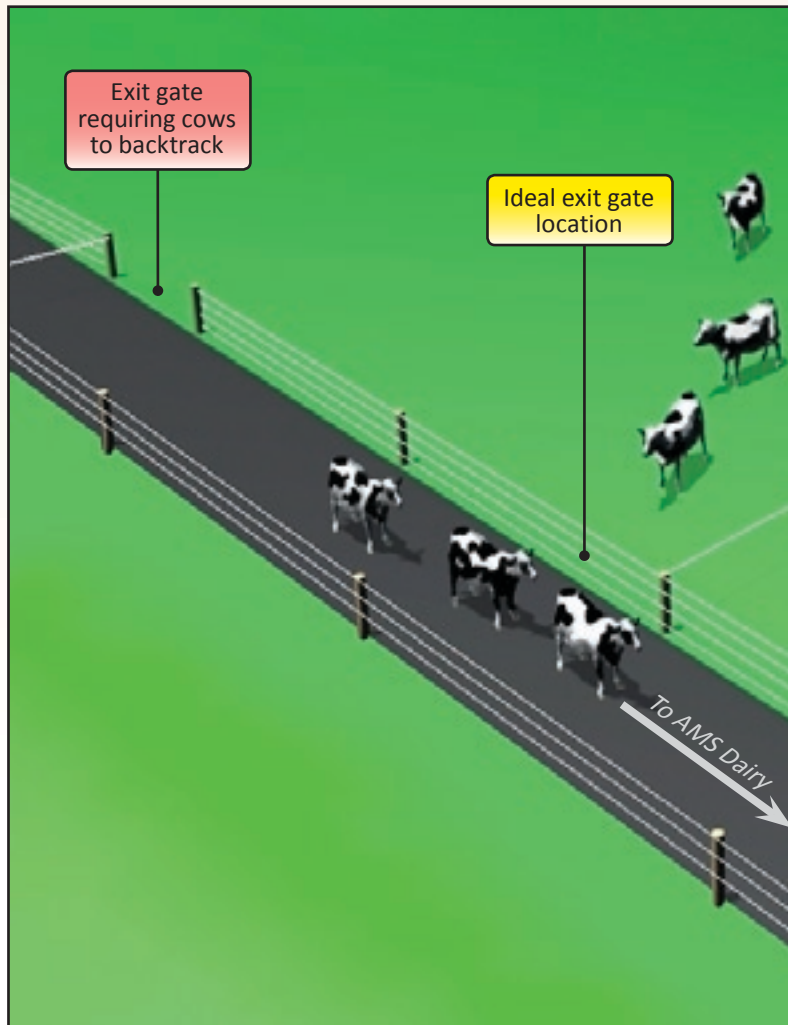
Your only option is to supplement each of the pasture breaks with feed on the feedpad. You would provide your cows with three breaks of grass (each of 4 kg DM/cow) and put 6 kg of supplement on the feedpad (per cow).

The cows will stop at the feedpad on the way out to each pasture break and spend approximately 2 hours eating here prior to going to the paddock.

Cows will not stay on the feedpad until all of the supplement is consumed as they are not comfortable with lying or standing on concrete for more than a couple of hours so they seek the comfort of a paddock to loaf and ruminate.

Gate position and cow movement

This gate location means cows have to backtrack to exit the paddock.



Whilst the scenario shown left may not look particularly confusing to you the farmer, cows will struggle. You may come in the next morning to find 80% of the herd has not trafficked from the paddock during the night!

Decision	Think about the impact...
Position of gates	Take particular care to minimise any backtracking cows may do when trying to exit a paddock.
Orientation of pasture breaks	A poorly oriented pasture break within a paddock can have an enormous impact on voluntary movement of cows from a paddock.

On AMS farms, the infrastructure and management action must work together to ensure the system works well regardless of ‘people’.

Distance from paddock to dairy

Be aware that if your furthest paddocks are more than one km from the dairy, voluntary cow movement may be affected.

If you suspect that cows will not move from a paddock due to distance, here is a strategy to try. Have cows traffic to the dairy during the night (they will willingly do this) and then have them move out of the paddock during the day. This way you will be around to encourage them to move during working hours.

Accurate pasture allocation

Why is accurate pasture allocation so important?

In a pasture-based AMS, access to feed is a key driver of cow movement. Accurate pasture allocation is the tool you use to ensure the predictability of cow traffic.

Your skills in allocating pasture become a critical factor in the success of the system.

Key issue	Think about the impact...
Time spent on pasture management	<p>Some time savings made in regard to milking and bringing the cows up to the dairy will be spent monitoring, managing and allocating pasture – expect to spend between 2-4 hours per week.</p> <p>If you already spend this amount of time, you should expect no change.</p> <p>If you do not already do this you are likely to see an improvement in the pasture utilisation levels - and as a direct result, a reduced cost of milk production.</p>

Inaccurate allocation of feed could severely and negatively impact on milking frequency, daily intakes and production levels.

Normally, cows will not walk out of a paddock until they have depleted the feed in that paddock. The point at which feed-depletion encourages cow traffic varies between cows and is known to be influenced by:

- stage of lactation
- health status
- oestrus (heat)
- confidence/experience in the system.

Anecdotal evidence suggests that inaccurate pasture allocation has a large impact on how regularly cows move around the system and therefore how often they are milked.

Key issue	Think about the impact...
Over allocation	Cows will stay in the paddock to continue harvesting during periods of over allocation. Over-allocation of pasture results in lower voluntary visitation to the dairy and reduced milking frequency.
Under allocation	Under-allocation of pasture will result in higher milking frequencies and higher voluntary visitation rates but reduced intakes, reduced litres harvested per minute and ultimately reduced milk production.

The on farm impacts of inaccurate pasture allocation are quite different between conventional and automatic milking systems.

Inaccurate pasture allocation	The impact...
Conventional farm	The effects of inaccurate pasture allocation in a conventional dairying system result in overgrazing, reduced feeding levels and/or wastage of pasture through over-allocation. This impacts on pasture re-growth and quality.
AMS farm	In an AMS the cows will move out of the paddock prior to overgrazing and will stay in the paddock to continue harvesting during periods of over allocation.

Accurate pasture allocation does cost time but the pasture utilisation and cost of production ‘rewards’, far outweigh the time cost. The cost of inaccurate pasture allocation will likely impact more on milk production (through a reduced milking frequency) than it would in a conventional system.

It is anticipated that those AMS farms that do not practice accurate pasture allocation will see:

- reduced per-cow performance
- potentially an increased incidence of mastitis due to irregular milking intervals and low frequencies of milking
- reduced voluntary movement and increased fetching.

These impacts may be incorrectly attributed to the automatic milking unit.

Milking more frequently won’t necessarily produce more milk.

If cows are milked at a higher **milking frequency**, particularly through early lactation, an increase in milk production might be expected. This will only be the case if milking frequency in the conventional system was the factor limiting production.

If intakes and rate of mobilisation of body reserves are the key factors limiting production, then increases in production will be minimal if milking frequency alone is increased.

Key issue	Think about the impact...
Overgrazing	Not so much of an issue with AMS as cows are generally much more inclined to move out of the paddock before they over-graze the pasture.
Undergrazing	If you over allocate you risk wasting pasture. This impacts on pasture re-growth and quality. You may need to send cows back to the same break to avoid this.

AMS itself is unlikely to result in a significant increase in **milk production**. If any increases in production are realised they will most likely be through increased feed consumption and/or increased milking frequency.

A distributed milking pattern

What type of milking pattern is achievable?

The two extremes of feeding regimes that can be successful with an AMS are a complete TMR system with no grazing and a complete pasture-based system with conserved pasture being the only supplement available to the cows.

Most Australian systems will fall somewhere between these two extremes and seasonal conditions will often determine where individual farms sit within the spectrum at different times of the year.

It is important to note however, that the behaviour of cows fed a Total Mixed Ration (TMR) versus pastured cows is very different and has an impact on milking patterns. These different behaviour patterns affect the trafficking of cows around the system.

The cost of capital outlay with an AMS usually means that a high machine utilisation rate is required as a driver of farm profit.

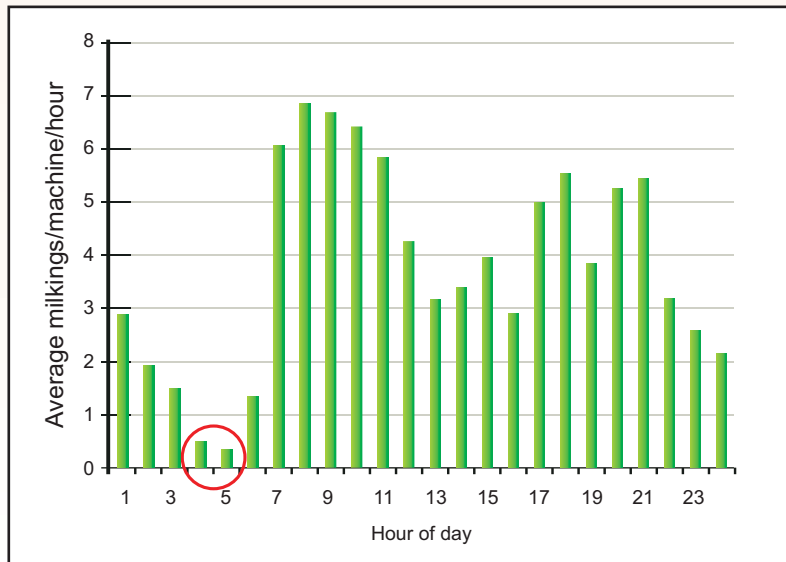
Don't forget though that levels of utilisation will vary depending on the type of system you operate and the daily consistency with the number of cows in milk and average stage of lactation. Have realistic expectations about what is achievable.

Approach to feeding	Impact on cow behaviour
TMR cows	<p>Cows in a TMR system tend to be very continuous about their activities; they eat, drink, loaf and ruminate throughout the whole 24-hour period.</p> <p>There does not tend to be a strong rhythm or cycle to the days' activities.</p> <p>In an indoor system high robot utilisation can be achieved consistently throughout a 24-hour period.</p>
Pastured cows	<p>Cows are very rhythmical with their activities with grazing bouts and rumination bouts.</p> <p>A number of factors influence the timing of their activities including:</p> <ul style="list-style-type: none"> • time of day - timing of new pasture breaks opening • sleep periods during the early hours of the morning. <p>In a pasture based system - cows are more inclined to have a defined sleep period during which a very low number of milkings is achieved.</p>

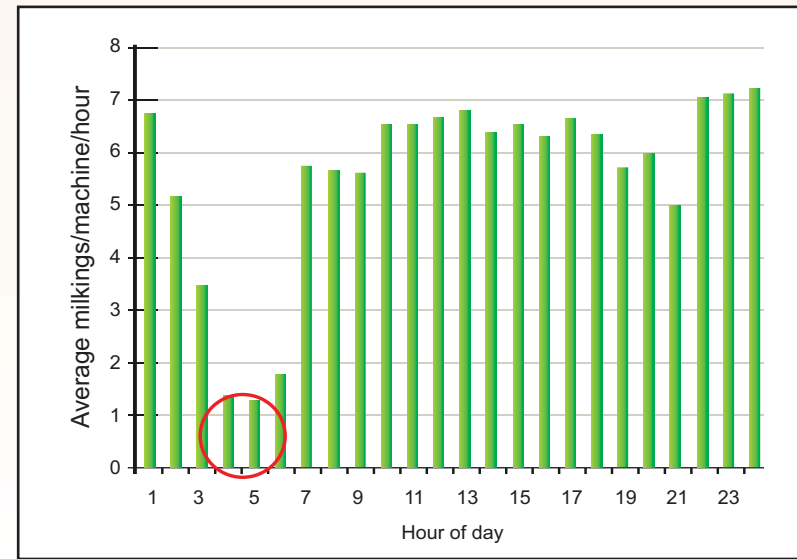
Whilst the throughput during 'sleep' time can be increased by offering additional incentives leading up to that time, it is difficult to achieve high robot utilisation consistently throughout a 24-hour period.

These graphs based on results from the Camden AMS research farm show that even at different times of the year, herd sizes, stage of lactation etc, only low throughput was achievable in the early hours of the morning. Compare this with graphs from a Dutch, barn style TMR farm on the next page.

To date the best known way of reducing (although not eliminating) the dip in the visitation curve during 'sleep' time is to provide the cows with three breaks of pasture per day instead of two. Work carried out in NZ has shown that by providing the cows with three pasture breaks instead of two, the total number of cows milked from midnight to 7 a.m. could be doubled.

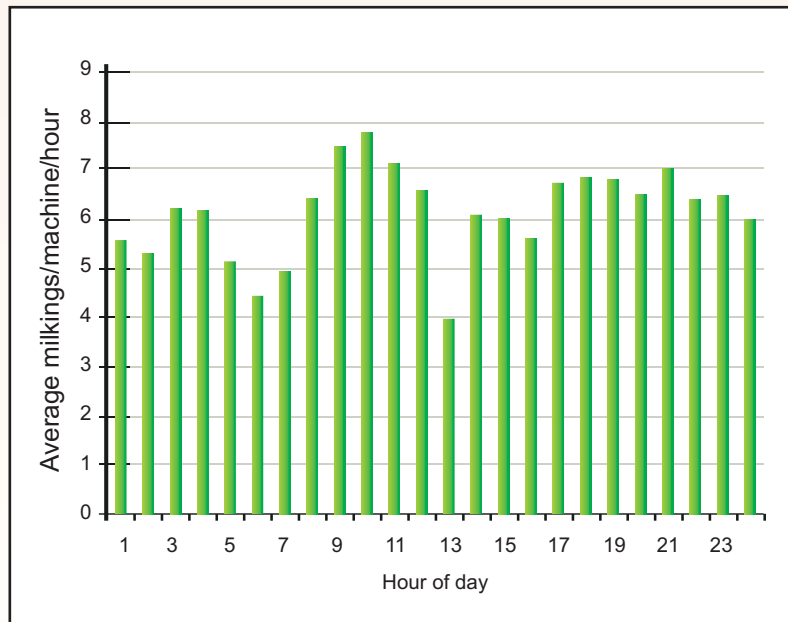


Pasture based AMS:
Milking distribution curve for a **low use period**.

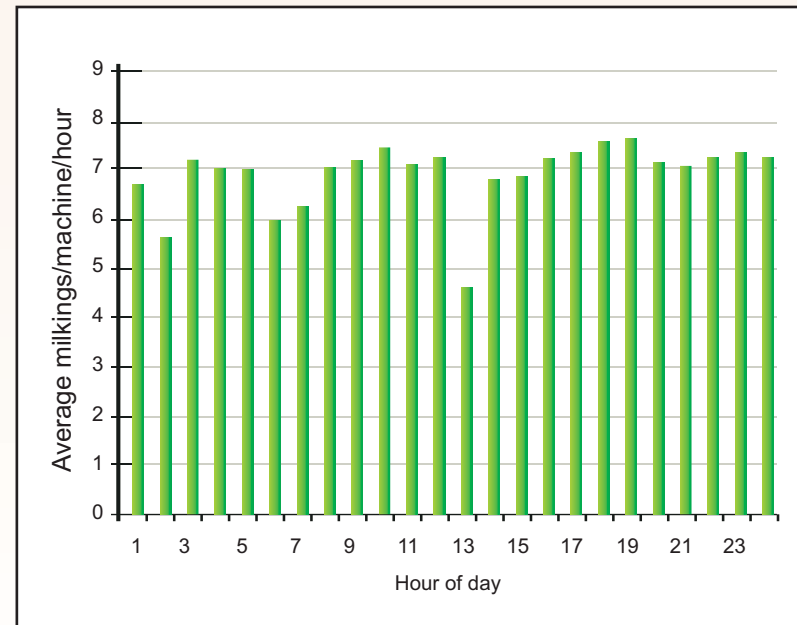


Pasture based AMS:
Milking distribution curve for a **high use period**.

Don't forget that if you have a pasture based system, it is not realistic to expect to achieve milking distribution curves like the example below.



Dutch TMR AMS farm:
Milking distribution curve for a **low use period**.



Dutch TMR AMS farm:
Milking distribution curve for a **high use period**.

A typical European system involves cows being housed indoors and fed a TMR diet. A well designed barn will minimise walking distances and allow easy access to the milking units. Cows will be provided with loafing areas or stalls and a feeding area.

In an Australian context, cows are offered pasture with supplementary feed made available as required — supplemented with approximately 1.5 to 2.0 tonne of concentrate per cow per year. In this scenario it is assumed that cows would be milked about twice a day and would produce about 7,500-8,000 litres per cow per year.

See below for potential machine utilisation levels during periods of high throughput.

The two biggest factors affecting machine utilisation are number of cows in milk and the herd average milking frequency. Thus the utilisation levels shown above would not be achievable throughout the year unless a year-round calving system was in place and the number of cows in early, mid and late lactation was relatively even at any point in time.

This would result in very low levels of fluctuation with regard to number of cows in milk and total number of milkings per day.

Ensure that your expectations of machine utilisation are realistic for the type of system that you plan to operate.

What's realistic?	Typical European Indoor System	Australian Pasture-Based System
Average machine utilisation	90%	80%
Number of milkings per AMS unit per day	170	150
Milk harvested per AMS unit per day (litres)	2,300	2,000

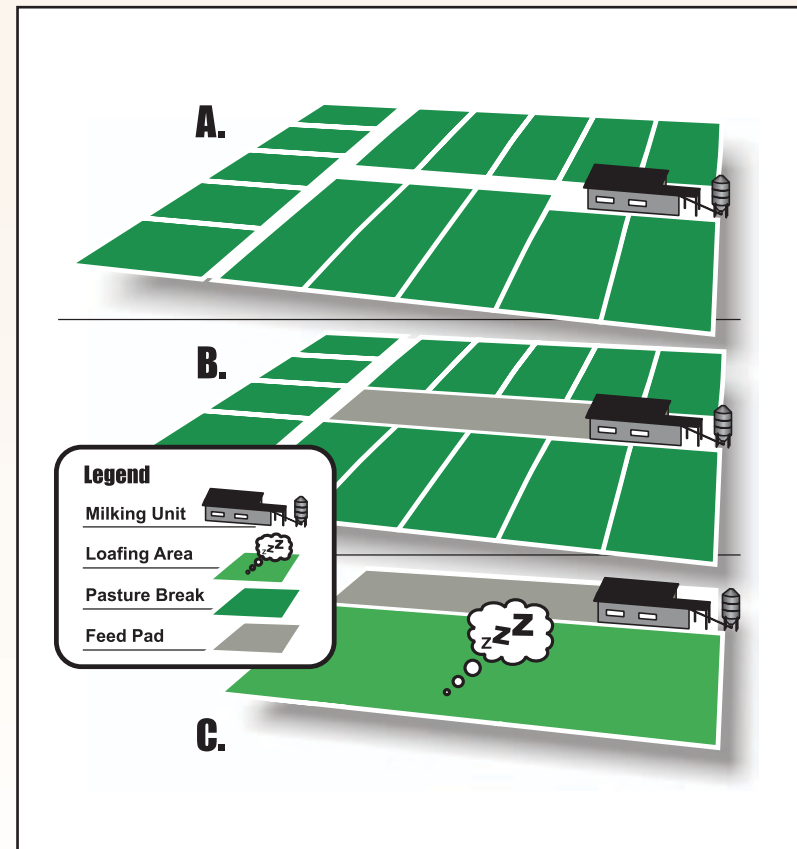
AMS in pasture based systems – Australian conditions

Farmers moving to automatic milking systems in Australia should continue to maximise their pasture utilisation as it still remains the cheapest source of feed. The on-going impact of drought means that many will also consider a feed pad and associated loafing area to be essential too.

Research undertaken at Camden has been aimed at understanding how an AMS can be managed under Australian conditions. The broad options for Australian automatic systems are:

- A.** Pasture based system – no feed pad
- B.** Pasture based with feed pad
- C.** Australian style intensive feeding

Many farms could expect to change between systems at different times of year or from year to year depending on climate, input prices and milk prices so infrastructure needs to allow the necessary level of flexibility.



Experience at Camden suggests that a set up that allows for three pasture breaks a day provides the most flexibility and can help ensure good cow traffic around the farm. Having a feed pad also increases your options and is considered highly desirable in times of drought.

Pasture based system - no feedpad

If the system does not incorporate a feedpad, supplementary feed can be provided in the paddock.

If pasture is allocated in small 'portions' (30-50% of the desired daily intake made in any one paddock) when cows have depleted this feed source, they will move out of the paddock. This will create an opportunity for cows to be milked at regular intervals.

Accurate pasture allocation is essential to ensure that the amount of available pasture is 'just right' to encourage cows to walk out of the paddock in search of more feed within an appropriate time interval.

Over allocation and under allocation of pasture is likely to impact on milking frequency and machine use efficiency.

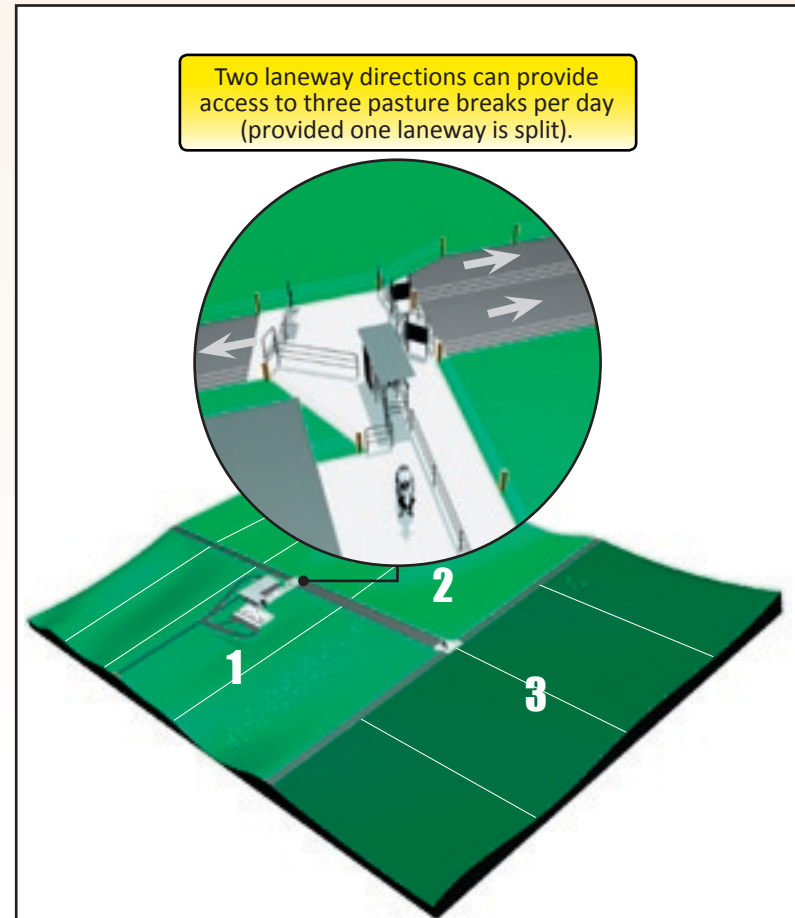
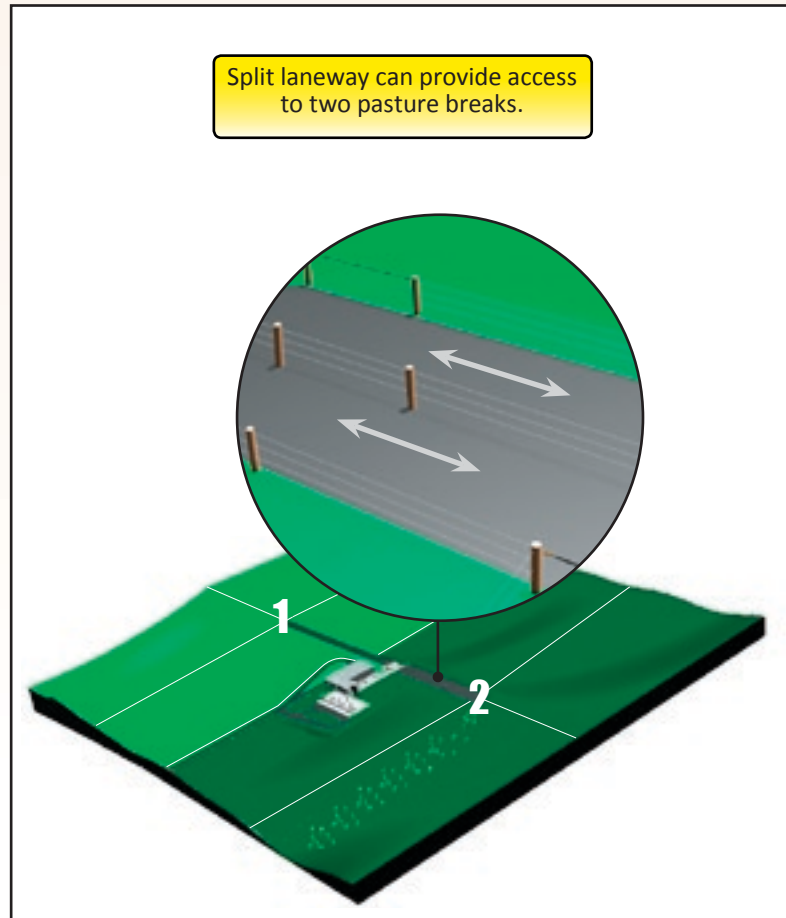
Farms can be set up to offer two or three new pasture allocations each day.

Be aware that offering three breaks encourages more cow movement around the farm and potentially, more traffic through the milking unit.

Three breaks a day results in a more even machine use (distributed) pattern over a 24-hour period.

Laneway set up	Access issues...
I want to work with what I've got...	<p>In this case your current layout determines how many pasture breaks you can have.</p> <p>If you currently have only one central laneway and you are not keen on changing the set up, then two pasture breaks is the only option.</p> <p>If your current layout has more than one key laneway then it may be possible to adopt a 'three break' system.</p>
I don't mind spending to get the laneways right...	<p>Here, the first task is decide how many pasture allocations you wish to have and then determine the layout that best achieves this.</p> <p>If you currently have a central laneway but don't mind taking on the re-development challenge, it is possible to create a 'three break' layout.</p>

Traffic is controlled using automatic drafting gates – cows are directed to holding yards, new pasture breaks or back to the same paddock after passing through the milking unit.



Pasture based system with feedpad

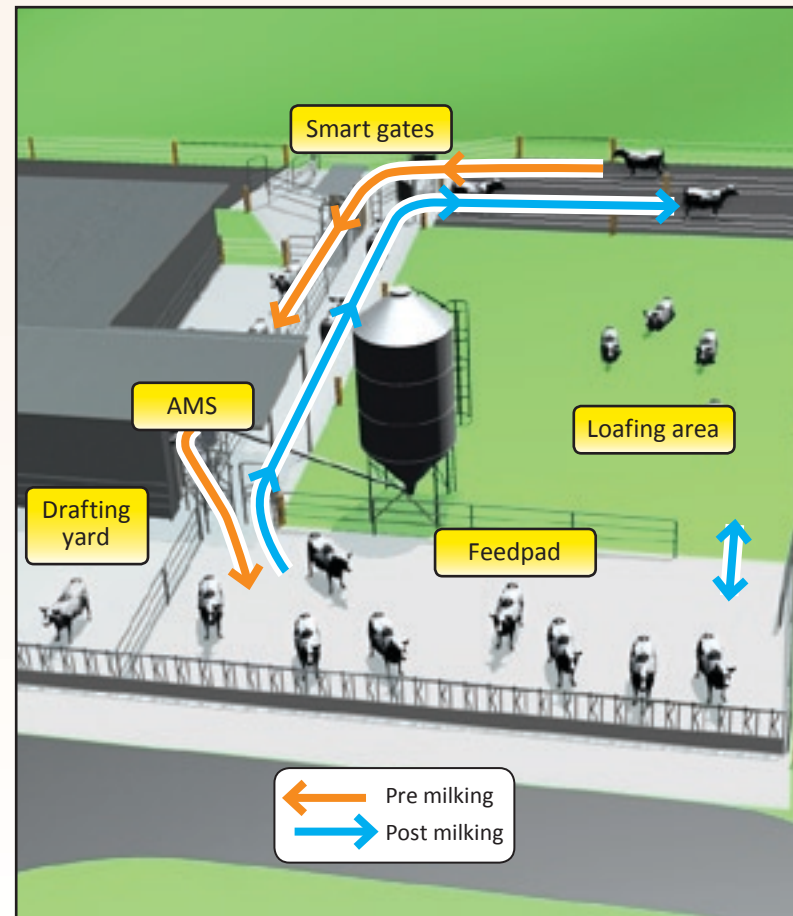
A feedpad with provision for loafing effectively acts as a third 'break' of feed i.e. two pasture breaks plus feedpad access. Note though that if there is no loafing area, then the feedpad will only be able to be used as a supplement to the given pasture breaks of the day.

The management of cow traffic depends on your set up.

- If you have a feedpad but no associated loafing area, be aware that cows will tend to leave a feedpad to access a comfortable loafing area for rumination.
- If your feedpad does have a loafing area associated with it, the management strategy to encourage cow movement will need to be different. In this case, the feedpad could be set up allowing cows to move from the loafing area to the feeding area via one-way gates. Cows could then move through a drafting gate to gain access to the loafing area after feeding.

Setting up entries and exits so cows can have access to feedpads before and after milking provides the greatest flexibility.

Access to feed pre-milking will mean intake is not limited by how often the cow is milked.



Above: The coloured lines show an example of the pre and post milking pathways cows can take to access the feedpad and paddocks.

Australian style intensive feeding

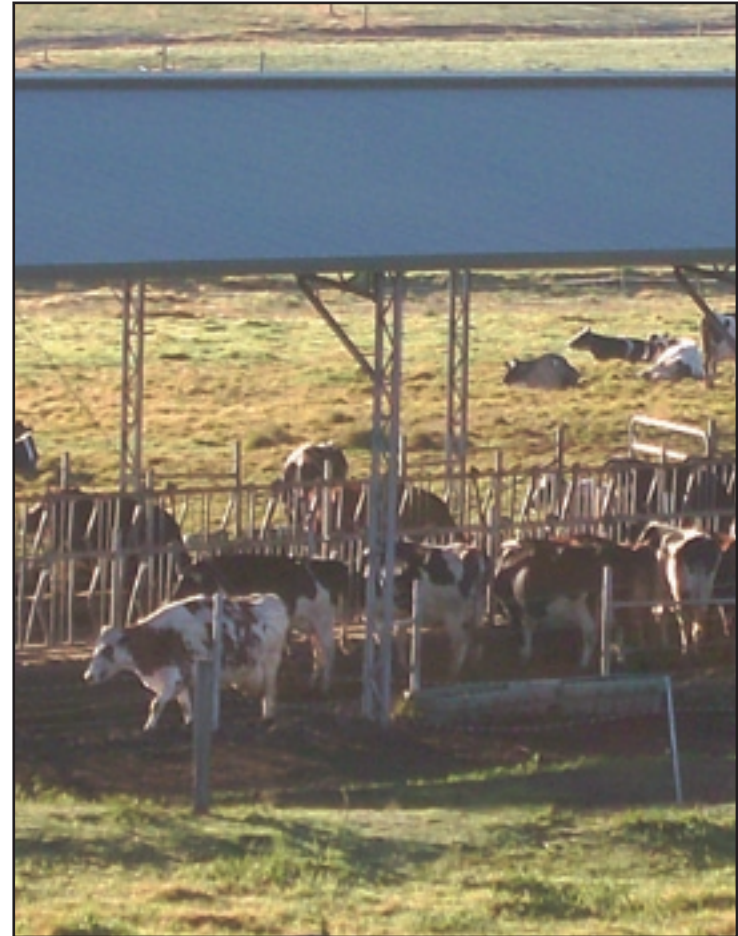
In an Australian style intensive feeding system, the feedpad, loafing and milking units are all in the same area.

Cow traffic can be controlled using one-way gates placed between the feeding and loafing areas.

In a semi-controlled cow traffic system, cows have free access via one-way gates from the loafing area to the feeding area. After leaving this area, cows pass through an automatic drafting gate and are drafted either to milking or to the loafing area if they do not have milking permission.

An alternative approach involves locating drafting gates prior to the feeding area. This way cows can be drafted through the milking unit prior to gaining access to the feed area or directly to the feed area if they don't have milking permission.

A well designed intensive feeding system can allow for grazing if conditions are right.



Above: Cows can be seen loafing in the background in a dry paddock adjoining the feedpad.

The challenge of change

The move to an automatic milking system is a big change for you, your staff and the cows. It helps if you can get a sense of how these changes may impact on your farm. Consider the following issues.

Staff attitudes/skills

Are your staff interested or threatened by the technology and new ways of doing things?

Their interest will be a big factor in the success or failure of the system.

- Staff will need thorough training in the operation of the system software and what to do when faced with alerts and alarms.
- Understanding the principles of how an AMS works is critical to problem solving.

Dairy cleanliness

Do you pride yourself on having a spotless dairy?

If so, then changes to cleaning routines might really bug you!

- It is impossible to have the same level of cleanliness as a conventional system as there is no start/finish time for milking.
- As manure is not hosed off immediately, more effort is required when cleaning.
- A water blaster/gurney is recommended.

Trusting the cows and the machines

Can you and your staff walk away to let cows explore and learn the system and use the milking units?

An AMS is not made to be watched!

- Cows learn very quickly when not pushed but it can be a difficult change in mindset for the people involved.
- Use the reports and software to monitor the performance of the system. If a robot is struggling to get the cups on, trust that the system will inform you.
- Always try to fix the cause rather than resorting to manually assisting the robot.

Coping with technology

How frustrated do you get when technology doesn't work?

If you like a 'quick fix' then you may find AMS glitches challenging.

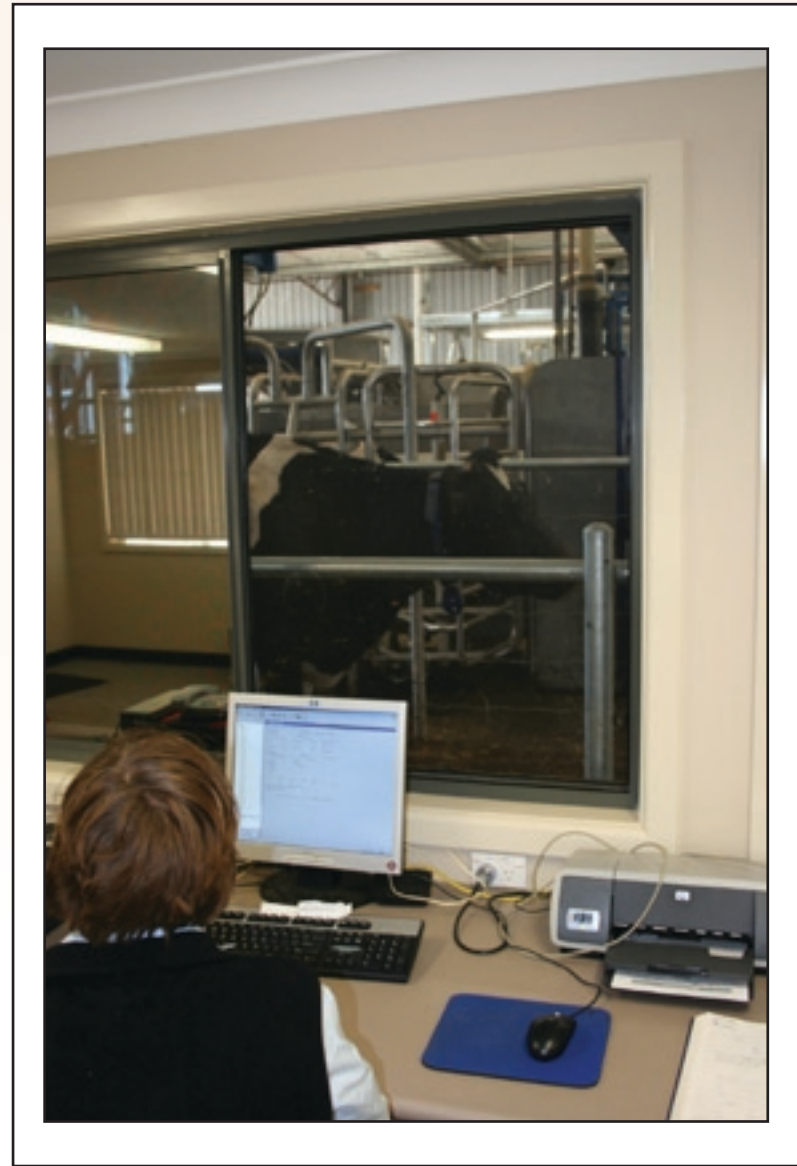
- It is better to find out why a milking station cannot milk a cow and remedy the cause – does the udder hair need singeing, does the laser need cleaning or does the robot need re-training for this particular cow's udder conformation?
- Avoid putting the station in manual mode and placing the cups on teats yourself – this only makes cup attachment more difficult for the robot and more frustrating for the cow at the next milking.

Being on-call

How will you cope being on-call 24 hours a day, 7 days a week?

Breakdown alarms may go off at any time due to distributed milking.

- Someone has to be on call – all day/night, every day.
- This person needs to stay within hearing range of their contact phone and be able to respond to the alarm promptly.
- Some people cannot cope with this – the phone feels like a ticking time-bomb. For others, it is a small price to pay for freedom from twice a day milking.
- Consider costs associated with on-call like time and travel expenses.



Changes to milking related tasks

With no start and finish times, milking becomes a background operation with an AMS but there are a few new tasks to be completed to ensure the automatic system works well.

Don't have to...	Still have to...	New tasks with an AMS...
Get whole herd up at once	Get the odd cow up	
Return cows to paddock to lock them in		

Fetching cows

In an automatic milking system, most cows will voluntarily go to the milking unit and back to the paddock.

Sometimes there will be no cows to chase up but be aware that most automatic milking systems involve some fetching – the number will vary in different systems and at different times of the year. Numbers tend to be elevated when a large proportion of the diet is pasture and/or a large proportion of the herd is in late lactation. Increasing the number of pasture breaks made available to cows within a 24-hour period (from 2 to 3) is likely to reduce the number of cows requiring fetching.

Routine checking of visitation records will reveal cows that have not yet been up to the dairy. These will need to be fetched. Some cows required for treatments may also need to be fetched.

Whilst fetching cows that don't move around the system voluntarily is an essential task, it is not onerous or time consuming. It is generally carried out in conjunction with other jobs like moving temporary fences or observing cows for heat.

Cows that need fetching will be easy to spot as they will be the last ones left in a given pasture break. Once they are encouraged out of the paddock they will wander to the dairy whilst farm staff set up the new pasture break which will be automatically made available to them a couple of hours later.

Milking

Don't have to...	Still have to...	New tasks with an AMS...
Cups-on, Cups-off		Singe udder hair
Teat spray		Reprogram/re-teach robots
		Monitor milking reports daily

Occasionally a milking robot will need to be reprogrammed. Tasks associated with reprogramming/re-teaching robots can improve cup attachment for particular cows and do not take long to complete.

The painless removal of hair from udders is essential in an automatic milking system to ensure lasers can locate teats easily – hairy udders cause confusion! This is well worth doing as it optimises milking speed efficiency. The task is usually done at the start of lactation and most cows won't need to have it done again until next lactation.

Changes to cleaning & machine maintenance tasks

Be aware that cleaning routines like hosing down yards are quite different to conventional dairy routines and that the maintenance program for the milking plant is much stricter.

Don't have to...	Still have to...	New tasks with an AMS...
Wash machines	Clean exterior of machines	Clean cameras & lasers several times a day
	Hose down yards	

Cleaning

In an AMS, machines are self cleaning but the yards still need hosing down when they become very soiled. This is generally done at quiet times when not many cows are present. Yard cleaning is often completed 'in passing' and at variable times rather than at set times each day.

Making sure that the camera and lasers are clean is an important job that is generally carried out several times a day – it is also usually completed in passing.

Remember, a clean of the lasers at the end of the day prior to leaving the dairy can make the difference between being called out at night or not, so it is well worth the minute or two it takes to complete.

Milking machine maintenance

Strict service regimes need to be carried out every three months to replace parts that might cause reduced machine performance and animal health issues.. This is typically taken care of in a compulsory annual service contract.

Note that liners still need replacing every 2,500 milkings but as fewer units do more milkings per set of cups each day, liners need changing more frequently – about every 15-30 days depending on machine utilisation levels.

Changing liners is a quick job with an AMS. At Camden for example, it takes less than 20 minutes to change the liners for the two units and only 40 minutes for liners and milk tubes (every 5,000 milkings).

Changing liners can be carried out in the comfort of the office or workshop. Use a spare set of cups to attach the liners prior to replacing the old set on the milking unit to minimise down time on the milking unit.

Don't have to...	Still have to...	New tasks with an AMS...
	Conduct regular maintenance	Oversee quarterly servicing
	Change liners & milk tubes	



Changing liners and/or rubberware is a relatively quick task with an AMS, but should be done more frequently.

Changes to pasture management tasks

Pasture and grazing management have always been the keys to profitable dairy farming but it is important to realise that pasture allocation is much more critical in an automatic milking system because it provides motivation for cows to move around the system.

Don't have to...	Still have to...	New tasks with an AMS...
	Manage grazing rotation	Ensure that feed allocation is maintaining cow traffic
	Maintain pasture quality, ensure timely nutrient application	

Pasture management

Incorrect pasture allocation affects pasture utilisation rates and pasture re-growth on all dairy farms but on an AMS farm, cow traffic and milking frequency are also affected.

When accurate pasture allocation was not practised at Camden the milking frequency of the early lactation cows dropped from 1.96 to 1.49 milkings per cow per day!

Pasture allocation

Don't have to...	Still have to...	New tasks with an AMS...
	Allocate pasture as part of a balanced diet	Monitor how allocation affects cow movement

Changes to herd testing, monitoring & recording

One change in routine that many farmers and their staff appreciate is in relation to herd testing. Imagine a herd test that costs you a total of 35 minutes!

Herd testing

In a conventional dairy, herd testing usually involves considerable effort by workers to collect samples from each cow. In an automatic milking system this process is automated and does not require the presence of staff, saving considerable time.

Each herd test requires about 35 minutes total attention time. This time is spent plugging in the automatic samplers, removing racks of full bottles, putting lids on bottles, sending samples off farm for analysis and cleaning the samplers at the completion of the sampling period.

Don't have to...	Still have to...	New tasks with an AMS...
Manually collect sample from each cow	Plug in samplers (but only one for each AMS)	
Allocate extra labour during herd testing period	Remove full racks of bottles	
	Send samples off for analysis	
	Clean samplers at end of sampling period	

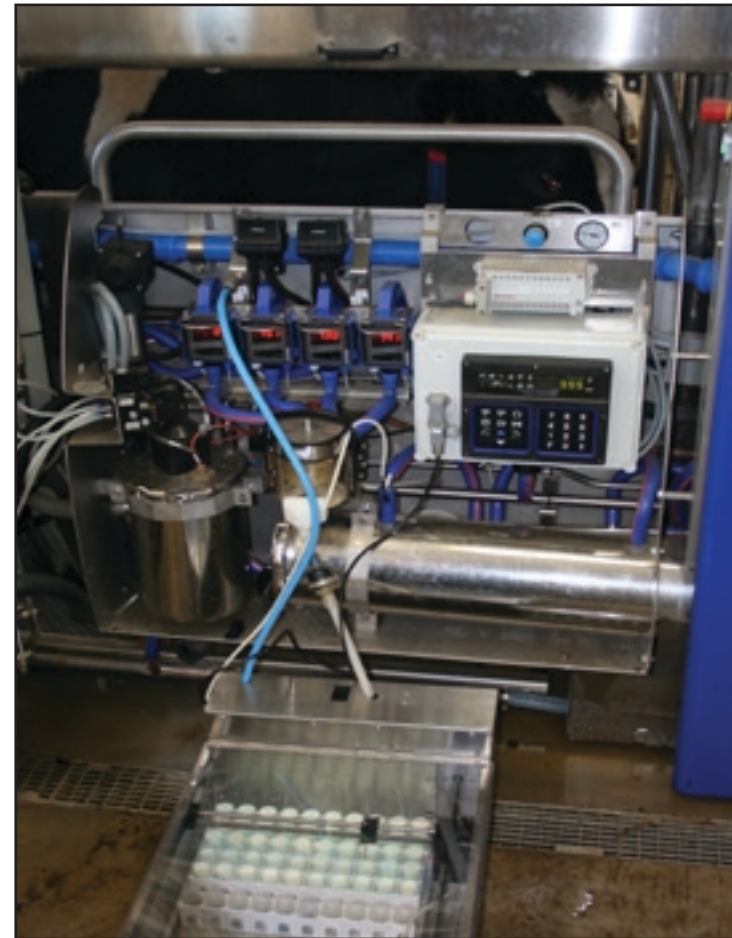
Monitoring and recording

An AMS automatically records a range of information relating to cow visits, milk production and machine performance.

Monitoring these records takes about 15 minutes each morning.

Don't have to...	Still have to...	New tasks with an AMS...
	Keep records	Review cow visits, production & machine performance over previous 24 hours
		Set up auto-drafting, mobile alerts

As milking occurs throughout the 24-hour period with only minimal human observation, staff should check summary reports of milkings and deviations every morning. At the same time, any cows requiring attention are set for auto-drafting or for farm staff to be alerted via mobile phone.



Herd test day is not so much of a headache with an AMS. No need for extra labour – basic tasks can be scheduled over the day.

Changes to animal health treatment tasks

There are a number of challenges when managing animal health treatment tasks in an automatic milking system.

It is fair to say that extra planning is required with an AMS but this effort is offset by the flexibility of being able to spend shorter periods doing a smaller number of treatments which ‘fit in’ with the daily routines.

Don't have to...	Still have to...	New tasks with an AMS...
Administer treatments at milking	Identify cows to be treated	Complete treatments at least once a day depending on drafting facilities.

Animal health management

The biggest change with an AMS is that treatment is often spread through the day rather than done in a single block of time as on a conventional dairy farm.

Blanket herd treatments like vaccinations that would normally be completed at milking time have to be spread over the day, often being done in three or four batches. It is important to remember that some cows may not come up to the dairy during workday hours and so they will have to be fetched. There are a number of options for managing whole herd or large batch treatments but the approach is largely influenced by the layout of the dairy and drafting facilities.

- Milking units may be set to draft all cows to a handling yard/treatment area.
- If feed and water are made available in this area then throughout the day, staff can come to treat all drafted animals every 2-3 hours.
- Milking units can be set to start drafting animals at 5am allowing the first ‘batch’ of animals to be treated when staff arrive in the morning.
- After each cow is treated, it is then removed from the software drafting group to avoid retreating when presenting back at the dairy later in the day.

Don't forget that when individual treatments are needed the machine can be set to hold a cow or to automatically draft her to the treatment area.

If the whole herd (say 80 cows per robot) requires treatment then it may take 10 hours for all cows to be milked – that is 8 milkings / milking station / hour.

A farmer with 4 milking stations (total 320 cows) could treat 64 cows at 7am, a further 96 animals at 10am and 1pm and the remaining 64 animals at 4pm.

Note that handling an outbreak of mastitis may require an increase in work with fetching cows to ensure timely treatment.

Changes to reproductive management tasks

Detecting cows on heat is not more challenging with an automatic milking system than a conventional set up as it is generally carried out during morning and afternoon paddock routines and at times when cows need to be fetched.

As in a conventional system all cows need to be checked regardless of their location. Cows on heat can be set for auto-drafting by the machine to a holding yard for insemination or treatment.

Don't have to...	Still have to...	New tasks with an AMS...
	Identify cows on heat	Check all locations for cows on heat
		Set auto-drafting parameters & schedule insemination/preg testing

Reproductive management

It is important to note that a synchrony or controlled breeding program may require more work since the cows need to be injected at certain hours, and this may involve fetching them to the dairy. This can be disruptive to the individual cow routines.

Similarly, pregnancy testing of cows can be more cumbersome in an automatic milking system. If the veterinarian is booked in for an afternoon visit, then cows can be autodrafted during the morning ensuring that all cows required for vet inspection are on hand.

The need for good drafting and holding facilities to be incorporated into the design of the system is critical. The holding facilities must be designed in such a way that cows can be kept comfortably for a period of hours, i.e. access to non-concrete surface, feed and water and possibly access to shade in warmer climates.

Bulls

When it comes to running bulls with the cows the options include training bulls to go through the system or turning them back at the smart gates. Essentially the bulls may self train themselves to move around the farm system by following the cows.

Natural mating has been shown to be incorporated successfully into an automated milking system on the DairyNZ research farm. In this system bulls were not trained to move around the system although some self trained. A bull was placed in each of the day and night paddocks. When they were “off duty” they had the opportunity to rest and feed without the disturbance of cows.

Section Two: Managing with AMS

2

The following section helps you undertake a whole system 're-think'. Consider the options and implications before you make final choices – time spent thinking about your preferences now may save headaches later!



Section Two: Managing with AMS

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Motivating cows to move

Essentially, cows move to get access to something they like.

In a pasture-based system, if cows are put in a paddock with an abundance of feed, water, shade, shelter and herd-mates it is unlikely that they will present at the dairy for milking at the desired frequency. Your job is to train cows to realise that they can get access to what they like by moving to find it.

Once on the move cows can be directed through the milking unit and milked if appropriate but it is important to realise that an AMS farm cannot operate successfully on the off-chance that cows will move around the system.

Some of these ‘desirables’ are more effective and reliable at motivating cows to move than others. Once you understand their relative effectiveness, you can evaluate all aspects of your system to see if cow traffic is being encouraged or impeded.

Will it motivate cows to move?	Feed is the most important tool farmers can use to encourage cow traffic.
Feed/Pasture	<p>Most reliable of all options.</p> <p>Will motivate cows to different levels depending on their appetite.</p> <p>Early lactation and high producing cows will be inclined to be more active in the search for plentiful and easily harvestable feed.</p> <p>Late lactation/low producing cows may tend to take a light picking from a paddock with low pasture covers rather than walk out of the paddock in a search for more feed.</p>

Will it motivate cows to move?	Water can potentially be used to encourage cow traffic but needs to be used in this manner with caution.
Water	<p>Dairy cows require and will seek large volumes of water on a daily basis. Water must be available to cows at all times.</p> <p>Water can be used to encourage cow traffic as long as it does not impact on water intake.</p> <p>Ensure that milk production is not negatively influenced by a reduced water intake.</p> <p>Note: if a system relies on water as motivation for movement, its effectiveness can be reduced if water becomes available in an uncontrolled fashion – e.g. puddles, surface water in paddocks and dew on pasture.</p>

The location of water can often be used to encourage cow traffic simply by its location without limiting the access that cows have to the water.

For example if the water is in the laneway outside the paddock then it may encourage some cows to continue walking to the dairy after drinking rather than returning to the paddock. At the same time it will not restrict cows that wish to traffic from the paddock to the trough and back to the paddock.



Will it motivate cows to move?

Additional or supplementary feed may act as an incentive when it is incorporated into the system.

Additional or supplementary feed

The degree of motivation that additional or supplementary feed will supply depends on how much is on offer and where it is located. Poor accuracy of feed allocation is the most common reason why this tool is not effective in encouraging cow traffic.

The total amount of supplementary, concentrate and/or pasture offered should be measured to ensure that cows are getting the right allowance (as a herd average). Ensure cows have the ability to consume the allowance.

Ideally, provide feed in small allocations (each less than 50% of daily allowance – ideally about 30%) to ensure that cows deplete the feed source and then start to move around the system.

Large allocations of supplementary feed can be made available in one location if that same location does not have provision for a comfortable loafing area – cows will move off to seek this.

Where a system does not incorporate a feedpad, supplementary feed can be effectively made available to cows in the paddock just as it is in a conventional milking system, provided that the total amount of the feed in the paddock (supplementary feed plus pasture) is not excessive.

Cows may choose to select high quality pasture over low quality feed making it very difficult to encourage them to stay in a feedpad and consume the supplementary feed.

On the other hand, high quality and palatable supplementary feed may be more desirable to cows than low quality pastures, again making it difficult to encourage cows to consume the pasture particularly if large volumes of supplementary feed are being made available.



Will it motivate cows to move?

Cows will willingly walk away from a feedpad or a feedtable in search of a comfortable area to loaf and/or ruminate.

Loafing area

Cows will willingly stand on a concrete feeding area for about 2-2.5 hours before they leave in search of a loafing area.

In an intensive system distinction between feeding and loafing areas allows some control over cow traffic.

In a pasture-based system if a loafing area is incorporated into the feedpad you can use it as a parcel of feed e.g. a third allocation of feed within a 24-hour period). Most cows won't leave the feeding and loafing area until the feed is gone.

If a loafing area is not available then the feedpad can only be used to supplement pasture breaks whilst cows are en route to the dairy/paddock.

Whilst feed is plentiful cows will generally remain for 2-2.5 hours then move off the feedpad.

Note: The level of crowding, quantity/quality of feed and social issues will affect movement.

Will it motivate cows to move?	Shade, shelter and cooling are incentives that have potential to work with varied impact depending on the location of these and the climatic conditions.
Shade, shelter and cow cooling	<p>On a very hot day cows are more likely to stay in the paddock rather than walk a large distance to the dairy for shade.</p> <p>Anecdotal evidence from the Camden AMS research farm shows that neither shade nor shelter can be reliably used to encourage cow traffic, particularly if the distance from the paddock to the shade or shelter is too great.</p>



Will it motivate cows to move?	Udder pressure or the desire to relieve the udder of milk is generally accepted as a very low ranked incentive.
Udder pressure	<p>It is possible that this acts as an incentive for some cows (particularly in an indoor system where walking distances are small).</p> <p>The desire of cows to relieve the pressure on their udders is not a strong enough incentive alone to be relied on for successful management of a pasture-based AMS.</p>
Will it motivate cows to move?	Social contacts may encourage cow traffic around the system, but it is unlikely that it can be easily used to encourage regular movement.
Social factors	Our understanding of social interactions and their impact on cow traffic is very limited at this stage.

If cows are not moving around the system in a manner that is suited to the farm’s objectives, then manipulate the timing, size, availability and/or location of the ‘movement motivators’ to modify the cow traffic.

Aim for a system that works for you, the cows and the bottom line!

Dairy Layout

Cow flow is important in any dairy layout but the impact of a poor layout is greater in an automatic milking system as there are usually no people present to compensate and encourage cows in.

In an AMS, milking is a background operation and occurs with only limited human input. The layout design must be extremely cow friendly.

Poor cow flow in an AMS dairy will:

- reduce milking frequencies
- increase adaptation periods for new/inexperienced cows.

A well designed drafting layout makes cow management tasks easier and maintains a high level of flexibility in the working day.

The manufacturer of the AMS equipment should be able to advise you on dairy layout and be able to provide layout plans. They should also be able to try to design a layout to fit a given building or other specifications when the need arises.

The major manufacturers of AMS equipment have an extensive amount of experience in this field and it is in their best interest for the installation to be successful.

With any AMS installation, take care to maximise the speed at which cows learn to move around the system. The installation should also ensure that a single person can encourage an inexperienced animal through the whole system.

Aim for...	Avoid...
Straight line traffic through the dairy encourages good cow flow.	Sharp turns on entry to waiting yard cause hold ups.
Easy people-access to machines and all areas of the dairy.	Access 'inconvenience' from drafting pens to holding paddocks.
Consistency with all left or all right-hand machines.	Drain grating on a bad angle can create the effect of a pit that may cause cows to feel insecure.
All machines look similar to the cows and have similar orientations.	Big distance between machine and any drafting gates controlled by the machine.
	Points where cows get bullied Long narrow funnels without wide exits allow one cow to hold up a long line of cows.

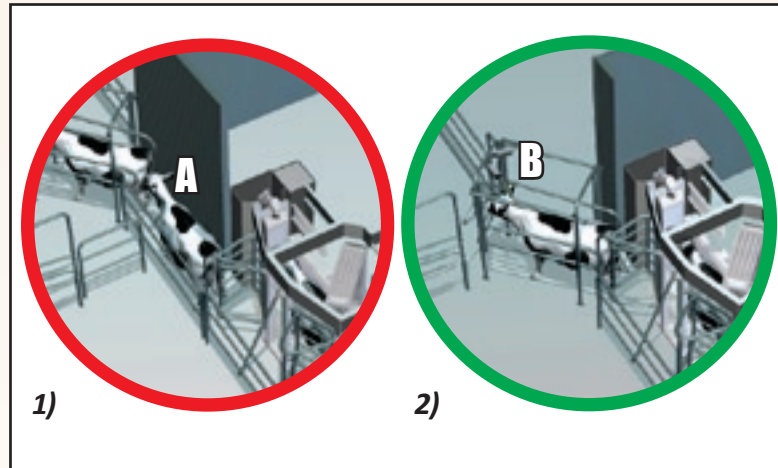
Feature	Think about...
Forcing gates	Appropriately placed forcing gates can create 'funnels' into the milking units – helps with training.
One-way gates	Consider a design that can be partially tied open to encourage a cow to push through.
Narrow laneways	A narrow laneway leading to a one-way gate can stop cows from turning around and encourages the cow to traffic forward – see diagrams over page.
Wide exit points	Avoid bottlenecks by ensuring exit points are wide enough to minimize the risk of bullying – see diagrams over page.
Drafting pen	An essential part of the dairy layout. The facility must allow for automatic drafting and an area for health treatments.
Holding paddock	An area attached to the drafting pen which allows cows to be automatically drafted during the night/early morning and to have access to feed and a loafing area. Improves flexibility for management of herd health and AI tasks, and allows for overnight drafting of targeted cows.
Automatic feeders	Best located after the milking unit to encourage cows to move through. If high feeding levels are anticipated, they can be used as a means of supplementing the cow with the portion of concentrate that she was unable to consume during milking time.

Within the AMS dairy there is the potential to incorporate automatic feeders whereby cows can access an additional serve of concentrate or grain.

At a milking frequency of twice a day, with cows producing 20-25 litres a day, their ability to consume feed in the milking station will be limited to about 4-5 kg concentrate/day.

Where farmers are targeting higher intakes, automatic feeders should be incorporated in the system layout.

Ideal location of drafting gates



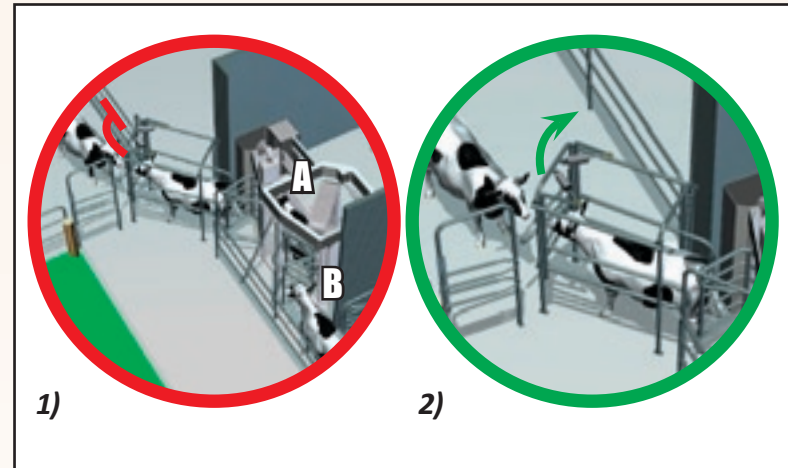
In the diagram above, circle **1)** shows drafting gates located too far from the milking station.

This allows the cow at A to stand in the area between the milking station and the drafting gate until the gate is reset for the next cow.

Diagram circle **2)** shows a drafting gate located immediately after the milking station.

The cow at B must walk through the drafting gate and has no opportunity to be drafted the wrong way.

Ideal exit layout



In the diagram above, circle **1)** shows a narrow exit point allowing a cow in the feedpad to bully the exiting cow which in turn blocks the exit for cows A and B.

Circle **2)** opens into a wider exit point limiting the impact of the bullying cow and resulting in freer movement through the one-way gate.

Milk Storage

It is important to appreciate the impact that voluntary and distributed milkings have on milk storage. Work with your supplier to ensure that an appropriate solution is developed for your farm.

In a conventional system, milk flows into the vat twice a day and is collected in one go, uninterrupted by the milking process. In an AMS, cows milk throughout the day and night so when the tanker arrives, milk flow into the vat will be disrupted.

The volume of milk being collected at each consignment impacts on how long it takes for the milk to be removed and therefore the total time during which milk cannot be sent to the vat.

If it takes 30 minutes for a consignment to be removed from the vat and a further 30 minutes for cleaning (depending on vat size, washing system, water pressure and brand of technology) then there will be no capacity to milk cows during this period.

This may have a large impact on the machine utilisation as this total “vat down-time” could result in all AMS machines being idle for a considerable period each day during milk collection.

'Vat down-time' options...	Think about...
Cleaning	Idle time associated with milk collection can be partially utilised by setting the AMS units to wash during this same period thereby limited further periods of down time.
Buffer vat	<p>Consider adding a small additional vat – this way milk can be diverted during the period of milk collection.</p> <p>Such a vat can automatically pump its milk into the large vat at a set time or volume when you can be sure that the main vat will be ready to receive milk.</p> <p>Factor in that a buffer vat will add some cost to the installation costs and may also have an impact on water and energy use on farm.</p>

Note that when milking resumes after the tanker has left, there may only be very small volumes of milk to be stored. Ensure that these small volumes are not frozen in the bottom of the vat by discussing your requirements in detail with your manufacturer. Have cooling systems designed for AMS installations.

Milk cooling

Complications can arise when an old vat is retrofitted within an automation system as a cost saving measure. Seriously consider installing the recommended vat to complete the installation and avoid ongoing issues that often arise with an antiquated vat system.

Talk to the manufacturers to ensure that the milk cooling solutions will be best suited to your herd size, number of machines, climate etc. The potential solutions will also depend on whether or not you have a buffer vat.

Cleaning of dairy and plant

It is difficult to have a dairy free of faeces for even a short period with an AMS because cows can be at the dairy at all times of the day and night. This does not necessarily create problems but it is seen as a negative aspect of an AMS by some people.

Plant cleaning is an automated process within an AMS. There is generally the potential to modify the frequency, timing and type of system washes/rinses occurring each day.

Factory pickups

Milk consignments can be collected from an AMS farm any time in a 24-hour period without the need for staff to be present.

All automatic milking systems come with sufficient automation to allow full system shutdown, cleaning and start-up after tanker collections.

Storage & disposal of “abnormal” milk

Initially you need to decide which of the following categories of milk you may wish to store separately and which needs to be discarded to the drain.

- Milk that is deemed “abnormal” based on SCC, conductivity and/or milk colour.
- Milk from cows with clinical mastitis — yet to be treated
- Colostrum - this may need to be collected and stored separately.
- Milk containing antibiotics.

Next, decide whether they can all be stored together or if they should have different storage solutions. For example, you may choose the following:

- Colostrum from first milking to be collected in a bucket (to be fed directly to calf of dam).
- Colostrum from second milking onwards to be stored in a colostrum vat to be fed to older calves.
- Milk from cows with clinical mastitis (yet to be treated) to be sent to colostrum vat.

In this case other categories of “abnormal” milk could be sent to the colostrum vat but note that the definition of abnormal will be set based on the thresholds in the support software.

The previous example would require that the system have:

- all “normal” milk going to the bulk milk vat
- the ability to collect milk in a bucket at the milking unit
- a milk line going to the calf milk storage facility
- a discard line.

Make sure your manufacturer is aware of your requirements and that they quote for this capacity ensuring that the installation cost is not unexpectedly increased.

It is common practice to set the machine to do a quick rinse after every milking session where milk is diverted away from the bulk milk storage.

This is generally carried out after milking a colostrum, mastitis, antibiotic or abnormal milk cow. Be aware that the implications of such a practice can have a big impact on machine utilisation (particularly number of daily milkings) when the milk from a large proportion of the herd is being diverted. For example:

- During the peak of calving in a seasonal calving herd there may be a high proportion of cows with milk still being categorised as colostrum on any one day.

A dairy layout that allows one or two machines to be temporarily dedicated to milk diversion with no plant rinsing occurring between cows would be useful in the above example. You may decide to use temporary yarding or gates to achieve this.

Note that if you choose not to rinse between colostrum and non-colostrum cows, colostrum antibodies may reach the bulk milk vat. Residual milk in the plant is carried through to the vat with the next non-colostrum cow's milk.

Talk to the manufacturers about the calving spread you anticipate, how this might impact on the throughput of the machine and potential technical solutions.



Keeping antibiotics out of the vat

Ensuring that antibiotics do not enter the vat (or calf milk storage) is the responsibility of every dairy farmer regardless of the system in use. You will need to re-think your practices and routines as many of the strategies you would normally use won't work in an AMS.

Strategies...	Think about...
Can I use leg bands, tail tape, paint etc?	The short answer is no. The robot can't see them.
Can I run a separate mob?	Running a 'hospital mob' and fetching them for milking twice a day may have advantages for some AMS operations but you need to be sure their milk will be discarded.
Can I treat then record?	<p>It is best not to do it this way. As soon as you identify a clinical cow, enter it on the computer.</p> <p>Commonly, staff go to the computer at this point to check the treatment history of the cow. On returning to the milking unit to treat the cow, you should double check that the robot is now set to discard the milk.</p> <p>If you set this in the office it should be visible at the robot on your return.</p>

For cows on a course of treatments over two or three days, it should be routine to check that the unit is discarding the cow's milk each time you attend the cow.

At the start of each day generate a list of cows that require any attention (treatment, mastitis or attachment checks, udder singeing etc). This list on a clipboard should live by the machines for the day.

As staff deal with each cow they should record what action they have taken on the clipboard. Prior to treating any cows, change their settings at the computer to ensure that their milk is discarded.

At the end of each day, the clipboard should be brought in and a double check that any cows recorded as being treated are set to have their milk discarded. Checking at this end of the day will at least ensure that if any antibiotic milk has entered the vat it does not contaminate an entire tanker consignment.

When treating any individual cow in the unit, check that her milk is set to discard on the touch screen.

This will ensure that you are not treating 1459 when you told the computer to discard the milk of cow 1549!

Managing herd health treatments

A different approach needs to be taken when blanket herd health treatments are necessary on an AMS farm.

It can be very disruptive to the cows' routines if the entire herd is collected to the dairy for animal health treatments. You may get away with it on an occasional basis but for more regular treatments the task is best carried out over a longer period of time. The reality is that this may be somewhat inconvenient but with thought a workable system is possible.

Herd health treatments...	Think about...
Vaccinations	<p>Set milking unit to draft all milked cows to a holding area from 5am on the treatment morning.</p> <p>Treat drafted cows on arrival at the dairy in the morning and release to a fresh break of grass.</p> <p>Meanwhile the system can continue drafting all milked cows for the remainder of the morning.</p> <p>Staff can attend periodically to treat drafted animals prior to releasing them.</p> <p>The majority of the herd can be treated by mid afternoon. Fetch any stragglers to complete the blanket treatment before day end.</p>



Fetching cows

“I’ll never have to get the cows up again. Individual cows always walk themselves to the dairy in an AMS, right?”

Wrong!

Within any AMS there will always be some cows that require fetching, at least on some days. Acknowledge this and keep a balanced perspective.

Provided the number of cows needing to be fetched does not result in large queues at the dairy, don’t get too caught up in the fact that some cows are not ‘volunteering’ to be milked.

It is important not to get obsessed with eliminating fetching all together.

If the system is meeting all other targets (e.g. production per cow, production per machine, machine utilisation levels, reproductive performance levels are good and animal health is good) then there is no real problem.

That said, realistic expectations about fetching are based on an understanding of the following:

1. You need to assign someone to fetching tasks.
2. You need to observe the cows that need fetching because they may be on heat or have health problems.
3. You need to monitor the number of cows that need fetching every day because it tells you whether your system is working properly.

Daily fetching tasks

Fetching may involve simply encouraging cows from the paddock to the laneway and allowing them to make their way to the dairy at their own pace. This type of fetching activity is not time consuming and is usually undertaken in conjunction with other paddock tasks like moving fences etc.

At other times, staff may need to walk individuals or small groups of cows all the way to the dairy for mating/herd health procedures.



Encourage any remaining cows to the dairy when setting up a new break.

While fetching times do require a farm staff member to be present to carry out the task and to set up fresh breaks, the actual opening of the pasture breaks 2-4 hours later can still be automated and does not require the presence of a staff member.

Observe cows that need fetching

It is worth observing cows that need fetching as they may require further management. Cows that you will often find staying back in the paddock may include:

Cows that often need fetching...	Think about...
Cows on heat (oestrus)	Oestrus cows are often pre-occupied and are less interested in eating when they are in heat.
Sick and/or lame cows	All cows to be fetched should be observed for signs of ill health or difficulty in walking.
Inexperienced cows	<p>These cows may not have the confidence to move around the system voluntarily.</p> <p>Inexperienced cows eventually learn to move around the system either when their confidence increases or when the incentives work more effectively for them (perhaps next lactation if they are low producing late lactation cows).</p>
Late lactation cows	<p>The reduced appetite of these cows results in lower levels of motivation – they are often content to stay in a paddock with reasonably low pasture cover rather than make the effort to move to fresh pasture where they could harvest feed more efficiently.</p> <p>If there are no concerns with milking frequency then there is no action required to remedy this situation.</p>

If different staff are doing the fetching over the week, consider using a clipboard record sheet that notes the date, time, paddock and number of cows that need to be fetched each time. This allows you to spot problems early.

Keep an eye on the numbers that need fetching

Without being too unrealistic, the aim is to keep the numbers of cows that need to be fetched to a minimum. So how many is too many?

Keep an eye on the numbers...	Rule of thumb...
More than 20% of the herd need fetching	<p>Obviously it depends on your individual situation but as a rule of thumb, if more than 20% of the herd need fetching, take action. If it happens on a regular basis, you need a major re-think.</p> <p>Start by providing smaller 'parcels' of feed to encourage more regular movement.</p>
High numbers of early lactation cows need fetching	<p>Early lactation is a period of high motivation so the percentage of cows not trafficking should be well below 10% (e.g. less than 10 cows in a 150 herd or around 7%).</p> <p>Check that allocations are accurate and made available at an appropriate time.</p> <p>If cows are averaging 2.5 milkings per day, look out for freshly calved cows milking below twice a day. These may need a health check to ensure they do not have metritis (inflammation of the uterus) or some other illness.</p>
Long queues at the dairy	<p>While this does not require staff to fetch cows from the paddock, it is still presents a problem.</p> <p>If the last cow has to wait more than 2 hours to get milked the system performance may be compromised.</p> <p>Again, start by allocating smaller parcels of feed to encourage regular movement.</p>

There are other factors that can affect cows' motivation to move and result in an increase of cows that need fetching.

Effect of seasonal/batch calving on fetching

In a seasonal calving system the vast majority (if not all) of the cows in the herd will be at the same stage of lactation at the same time. The number of cows needing to be fetched may fluctuate depending on the stage of lactation.

Monitoring milking frequency, intakes and production levels will allow you to assess when it is necessary to modify the feed allowances (pasture, supplementary feed and/or concentrate) to ensure that cows continue to deplete feed in a timely fashion and move around the system at the right rate.

In late lactation cows will require less feed and if their feed availability is not gradually reduced then they may struggle to consume all of the feed – resulting in feed being wasted and milking frequency being reduced.

You may need to change the selection criteria for milking permission for cows at different stages of lactation particularly if you are accepting different target milking frequencies as the cows move through their lactation.

No matter what stage of lactation, high production level results in a strong appetite. It is important to remember that, high producing cows move around the farm more frequently in search of feed and subsequently have the opportunity to be milked more often.

Effect of feed allocation on fetching

The number of cows needing to be fetched is also affected by the amount of feed you offer and the amount of time that elapses before a new break is provided.

Key terms

Active access time: The time available to cows to enter a break and start eating.

Voluntary movement time: The time available for cows to voluntarily move out of the depleted break.

Think about...	The impact on fetching ...
Allocate the right amount	If you allocate too much feed in any one break cows will be reluctant to move and you will end up having to collect them.
Provide enough time to eat	Allow enough time for cows to eat what is provided. Keep track of active access time. If active access time is too short it can mean not enough 'mouths' get into the paddock and the feed allocation is spread amongst fewer animals. It will then take even longer for the reduced number of cows to deplete the allocation and move out of the break.
Provide enough time for voluntary movement	If you don't allow enough time for cows to get to the new paddock and are rushing to close the one they are leaving, you have not given cows enough time to voluntarily move. This problem is worse if you have over-allocated feed.

Minimising fetching...	Think about...
Cows not moving from one paddock to the next	<p>Consider a slight shift in the proportion of feed allocation – a 40/60 split between day and night allocations should create improved night time movement.</p> <p>Smaller parcels of feed encourage more regular movement.</p>
Cows not coming out of paddocks at back of the farm at night	<p>Consider having the cows go to these paddocks at night and coming out during the day.</p> <p>Cows are more motivated to move during the day and it is easier for you to monitor and intervene if necessary.</p>



Cows trafficking to a new pasture break.

Increasing milking frequency

Strategies to increase the milking frequency of target groups of cows include:

- Increase the number of new breaks provided within 24-hour periods. You may need to change the criteria on which milking permission is granted for some groups if you do not wish to increase the milking frequency of the entire herd.
- Provide additional motivations for the targeted group of cows. For example, provide only the early lactation cows access to supplementary feed in the feedpad.
- Direct targeted cows to the waiting yard without accessing pre-milking supplementary feed.
- Manage cows that require less frequent milking so as to free up capacity. This allows target groups to be milked more often as a result of reduced queuing.

These strategies will provide a consistent milking interval for the target group of cows.



Early lactation cows at Camden accessing supplements in a feedpad after milking. Note that on this farm an existing shed was used to house the AMS unit and the feedpad.

Heifer Training

In conventional and automatic milking systems heifers should perform at about 80 - 85% of performance level of experienced, mixed age herdmates but there are a number of reasons why their performance may be compromised.

The most common reason within a conventional milking system is poorly grown heifers that have difficulty competing within the herd. In an AMS lack of experience is an additional reason that may result in the underperformance of heifers. An inexperienced animal (heifer or cow) may have difficulty finding her way around the system, may lack the confidence to move through some areas of the system and may struggle to compete with herdmates.

Compared to experienced contemporaries these characteristics will generally result in:

- reduced milking frequencies
- reduced regularity of milking intervals
- reduced access to high quality feed
- extended intervals without access to feed whilst waiting for access to milking units.

Done well, pre-calving training can increase the performance of heifers by about 10% compared to untrained contemporaries.

The best time to educate heifers about the AMS is before they calve. No matter when it is done, the act of encouraging animals around the system has the potential to create disruption to the established herd but it makes sense to avoid the busy calving period. Pre-calving training benefits the entire AMS system because:

- Milk production will be greater than if the heifers are not trained prior to calving.
- Total labour requirements associated with training heifers are minimised - during the calving period very limited labour is available to assist heifers with adaptation to the system.
- In the pre-calving period, heifers' appetites are reduced as rumen capacity is restricted by the growing calf and their daily requirements are lower because they are not yet lactating. The effects of inexperience will only limit access to feed rather than access to feed and milking frequency.
- Minimal encouragement of freshly calved heifers will result in a more settled milking herd — one that is not regularly disrupted by staff trying to aid inexperienced heifers.

Milking frequency from the day of calving should exceed twice-a-day unless the pre-trained heifer is sick/unwell.

A detailed pre-calving training regime

Heifers are like young children: they are inquisitive and they learn through exploration. The vast majority of their learning and confidence building will be gained through following experienced herdmates and through exploring the system themselves. Patience and a gentle hand are the two most valuable assets during heifer training. Yelling, hitting and using extreme force is never appropriate.

As with all operations there are a large number of ways to carry out heifer training. The system detailed here is one known to work and can be easily implemented on farm.

Pre-calving training regime	Think about...
60 days before calving	Bring heifers into the milking herd in groups as they approach 60 days pre-calving. Keep in the milking herd for a maximum of two weeks. Note that longer is not better.

In a sense, you are training heifers to cope with the fact that things change in an AMS. Excessively long periods of training are not recommended for this reason.

Experience at Camden shows that training periods of 6 weeks were too long.

Long training periods reinforce to the heifer that she should not expect anything different to what she has experienced during training.

When milking eventually occurs, the heifer can become unsettled.

Pre-calving training regime	Training Day 1
An intense training session carried out by two people if possible.	Expose heifers to as many types of gates and patterns of traffic as possible within a few hours. Work out your training route beforehand and set up gates appropriately. Check computer settings. Bring a small group of heifers to the waiting yard and allow any that show interest to progress through first. Gently encourage heifers through the system. After the session, send heifers to a paddock where there are cows but not much feed i.e. a pasture break where cows are voluntarily leaving. This provides incentive to move rather than just eat and ruminate for an extended period.

Many heifers will move to the dairy within the first night of being with the milkers – they may even make their way through the milking unit and down to a fresh break of pasture.

Important: Walk heifers through all units. Otherwise it is highly likely that during early lactation they will have a preference for that unit only. This impacts on the utilisation of the other machines and could result in a queue of heifers at one whilst other machines are idle.

Pre-calving training regime

Training Day 2

Some heifers may still require assistance on day two

On the morning of day two any heifers found in the waiting yard can be encouraged through the milking unit. Fetch any heifers and other cows that didn't move out of the paddock from the previous day.

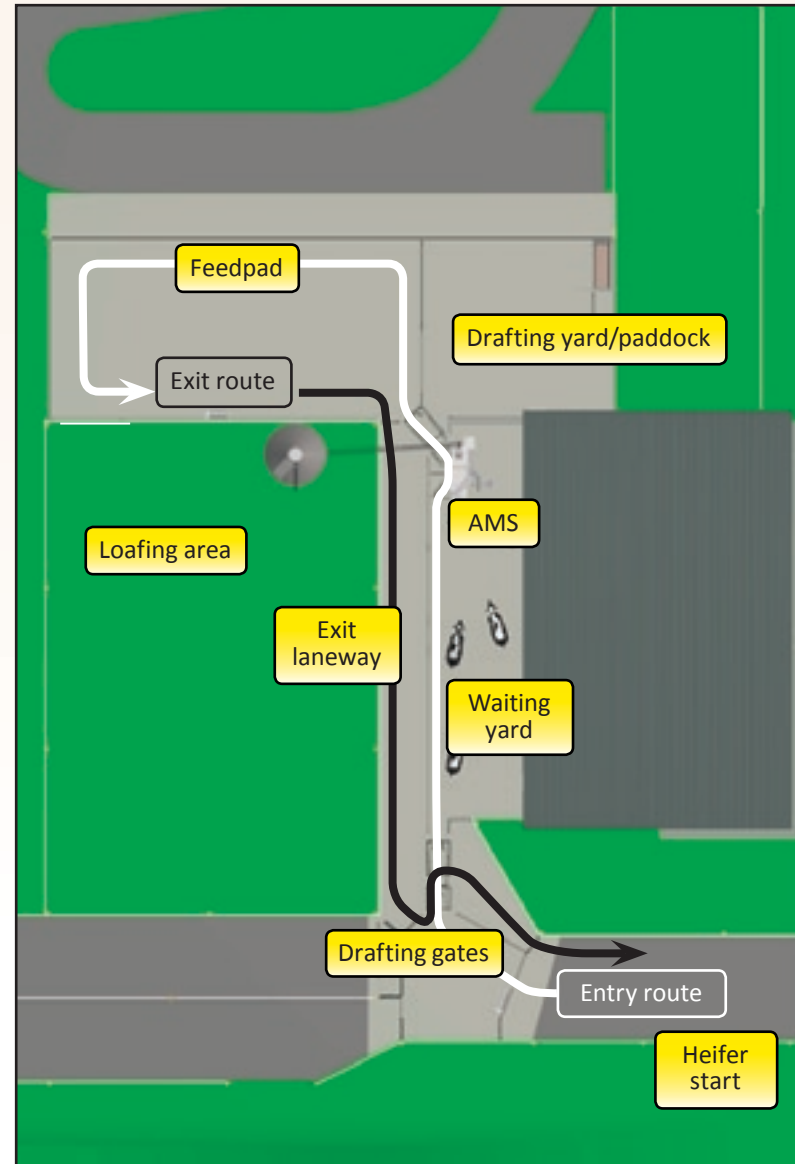
Leave in the waiting yard until late morning – most will traffic through on their own. Gently encourage those who haven't.

Within about 48 hours most heifers will be trafficking around the system completely unassisted.

The sooner the heifers move around the system by themselves, the quicker their confidence builds and the less encouragement they require from you or your farm staff.

A good dairy layout funnels animals into areas they are expected to move through. Forcing gates are also very useful, particularly when working alone.

Right: Example of an intensive training route indicated by the lines. Heifers are exposed to one-way gates, a set of automatic drafting gates and the AMS milking unit.



Computer settings during training

The two heifer training regimes trialled at Camden are called “Pass through” and “Fed”. Note that neither has been shown to be more beneficial to early lactation performance than the other so find settings that suit your system - those listed here are intended as a guide only.

Computer settings	Think about...
“Pass through”	<p>Allows heifers to pass straight through the milking station every time they present there during the training period.</p> <p>In this regime the heifers learn the cow traffic system but are not exposed to any experiences inside the milking unit.</p> <p>They use only very limited amounts of milking unit time during each training day which is useful during periods of very high machine utilisation.</p> <p>A small proportion of heifers may try and push out of the station during the first milking.</p> <p>If they are successful in achieving this at milking one, they may try to do it repeatedly until the habit is broken – take steps to avoid this as breaking such a habit takes a bit of effort.</p>

Breaking the ‘pushing out’ habit.

The only way to break the ‘pushing out’ habit is to be present at every milking and to block the exit until cups are removed. You will probably only have to do this for 2 or 4 milkings.

Computer settings	Think about...
“Fed”	<p>Aims to expose heifers to some milking unit experiences rather than just having them learn the traffic system.</p> <p>A small ration of concentrate is fed - typically an allowance of about 3 kg per day.</p> <p>They are exposed to the sound and vision of the robotic arm moving - if possible are teat-sprayed prior to leaving the unit.</p> <p>Note that not all brands of AMS allow you to carry out this function.</p> <p>To achieve the teat spraying function the robotic arm must be trained to the location of the heifer’s udder on day one of training.</p>

During training heifers should be exposed to the same path of traffic as the main milking herd. They will then be able to follow the experienced animals to aid their learning.

It is recommended that they be allowed into the dairy only if they passed the drafting gates after an interval of at least 6 hours.

Six hours ensures that there are ample opportunities for exposure to the dairy but plenty of time wandering around the system too.

Post calving management

At the first milking after calving it is recommended that all heifers and cows be monitored and assistance provided as necessary. Monitoring the first milking of heifers allows staff to take the following actions if required:

- Check each animal for signs of mastitis or excessive swelling.
- Remove excess hair from their udder.
- Train the robot to an individual's teat conformation.
- Dispense additional feed as a distraction.
- Check teat cup attachment – manual attachment may be required with particularly nervous heifers.
- Monitor let down.

Well trained heifers in good health and with no calving associated health problems should present for milking at least twice a day from day one of the lactation.

A heifer that starts with a low milking frequency of less than 1.8 milkings per day should be carefully inspected for retained foetal membranes (RFM) or inflammation of the uterus and treated accordingly.

Realistic expectations: Heifer performance

Remember, it takes most heifers at least two sessions during the training period to be reasonably comfortable and confident about entering any milk harvesting facility.

If heifers are well grown and introduced to a well managed AMS with good cow flow then they should settle into the system well.

Minimise negative experiences at the dairy, particularly during training but also during the post-calving period.

Make sure that after the initial training session heifers have the opportunity to explore the system without human encouragement.

Whilst leaving a heifer to explore the environment is encouraged, there is a limit. Do not leave heifers in the waiting yard for an extended number of hours, or repeatedly, without assistance. This will cause the animal to associate the waiting yard with unpleasantness and may hinder the speed of adaptation.

Pre/post-milking udder preparations

All brands of AMS machines will offer some form of udder preparation and/or sanitation.

Pre-milking teat sanitation

Udder preparation options...	Think about...
Pre-milking teat sanitation	<p>Pre-milking sanitation is not common practice on conventional farms in Australia.</p> <p>It can be carried out in an AMS with limited impact on labour and lifestyle.</p> <p>Spray must be washed off the teats prior to cup attachment.</p> <p>Additional time spent is likely to impact on the achievable number of cow milkings per day through each milking unit.</p>

Note that to date, no research on the impact of pre-milking sanitation on the incidence of mastitis within a pasture-based context in Australia has been undertaken.

Pre-milking teat cleaning

Pre-milking teat cleaning systems vary but commonly consist of two roller brushes moving around the teats or a cleaning cup which cleans individual teats using warm water and warm air and vacuum for drying.

In Australia it is common practice to spot clean only those teats that are particularly dirty while in AMS herds around the world, blanket teat cleaning is practiced.

Pre-milking teat cleaning	Think about...
Is it necessary?	<p>Cows in a pasture-based AMS environment will normally be relatively clean even if track condition is poor as they walk at their own pace to the dairy.</p> <p>No system currently on the market can assess an udder. You must make a decision to 'clean' or 'not to clean', then change settings accordingly.</p> <p>When conditions deteriorate, put in place blanket teat cleaning to prevent coliforms and sediment causing milk quality problems.</p>

If the pasture-based system is well monitored and managed there is generally no reason why omitting the teat cleaning procedure should reduce the quality of the bulk milk.

Remember though that if teat cleaning is not being implemented there is always the potential for cups to be placed directly onto dirty teats and that milk quality may be affected.

Most pre-milking teat cleaning systems act to stimulate milk-letdown, clean teats and remove foremilk ('strippings'). Some brands use the actual milking cup to remove the foremilk. This milk is discarded prior to milking as it is known to have the highest bacteria count. This strategy can help safeguard bulk milk quality.

Pre-milking teat cleaning	Think about...
Blanket vs targeted teat cleaning	<p>Consider permanently setting the teat cleaning option to 'on' for cows that often present with dirty teats. If this is only for around 5% of the herd, improved milk quality will offset any time costs.</p> <p>Lots of dirty cows may be caused by cows lying on laneways, in feeding areas or long queues for milking. Modify the timing, size and/or location of pasture breaks/feed.</p>
Effect on teat and udder health	<p>The long term effects of pre-milking teat cleaning on teat condition and udder health is unknown under Australian conditions.</p> <p>It is assumed that as most Australian farmers do not wash cows' teats currently, the impact of omitting teat-washing in an AMS should not increase the incidence of mastitis in comparison to a conventional system.</p> <p>There is the possibility however that AMS cows could have a greatly reduced incidence of mastitis compared to conventionally milked cows if the teat washing system is used. You decide what is right for your farm.</p>

Pre-milking teat cleaning	Think about...
Let-down, yield and milking speed	<p>Australian cows have been bred to not require tactile stimulation of the teats to induce a let-down.</p> <p>Research carried out in Australian pasture-based systems has shown only limited advantages in terms of let-down and milking speed from washing cows' teats.</p> <p>Continue to monitor udder/teat health and milk quality and make strategic decisions regarding teat washing that suit your farm objectives and current conditions.</p>

In one Australian-based trial, washing teats reduced milking time by 20 seconds but it took 80 seconds to complete the teat cleaning process. The net result was an additional 60 seconds for each milking session.

Continue to monitor udder/teat health and milk quality and make strategic decisions regarding teat washing that suit your farm objectives and current conditions.

Post-milking teat sanitation

Whilst no Australian research has been carried on the effectiveness of post-milking teat sanitation within an AMS, it is logical that teat spraying is just as important in an AMS as it is in a conventional system. For this reason it is recommended that a blanket setting is used to ensure all cows are teat sprayed after milking.

Post-milking teat sanitation	Think about...
Effectiveness	<p>An automatic system that uses a robotic arm to spray teats.</p> <p>Prior to commissioning, run tests to determine if the volume of teat spray dispensed at each application is 18-20 ml per application.</p> <p>If volumes are less than ideal check that you are not using an economy setting on the computer. Do not accept lower volumes - work with your dealer to get it right.</p> <p>The accuracy of automatic sprayers is variable between brands and manufacturers but is generally much greater than the average human operator!</p>

Post-milking teat sanitation	Think about...
Ready-to-use vs mixing your own	<p>Ready-to-use (RTU) teat spray formulations are strongly recommended to avoid suspensions settling – these can cause blockage in the spray nozzle, particularly if staff are not checking consumption levels regularly.</p> <p>RTUs allow the reservoir/container to be filled up during the week and should last throughout the weekend.</p> <p>If mixing your own teat spray, it needs to be mixed daily or as per manufacturers’ recommendations.</p> <p>Clearly follow the AMS manufacturers’ recommendations as some products may not be compatible. This could result in poor coverage of teats or cause damage to AMS components.</p>

Other countries do not always dispense the same volume of teat spray that we do in Australia as pre-milking sanitation is more widespread and the cost of the spray too high to allow for high application rates.

If after checking computer settings, the volumes are still too low, your technician may need to replace the standard factory nozzle with one that works for Australian conditions.

Removal of excess udder hair

All brands of AMS rely on automated detection of teat location with lasers and/or cameras. To ensure that milking cup attachment time is minimised and attachment success is maximized, excess hair needs to be removed.

Hairy udders can result in complete failure of cup attachment on one or more teats. Udder hair distorts the view of the teats and debris like faeces, mud or bedding materials can hang from the udder resulting in confusion on teat location.

Removing excess udder hair...	Think about...
When is best?	<p>All cows should have excess udder hair removed prior to introducing the herd to the new AMS dairy. Remove hair after each calving, ideally as part of the first milking procedure. Hair can be removed in the milking unit or in a treatment facility – ease of access will dictate where is best.</p> <p>During the lactation, some cows may require a second go but most will not. At the Camden AMS research farm, Illawarra cows were consistently found to require more frequent hair removal than Friesians.</p>

It is important that reports are monitored for cows having trouble with cup attachment. Whilst conformation will be the cause for some cows, removal of even short udder hair often helps to reduce attachment problems for these cows.

The two hair removal methods are clipping and singeing.

Excess udder hair	Think about...
Clipping	<p>Electric clippers are the most effective hair removal tool especially for dirty and/or wet udders. This is a slow method and may result in cows kicking at the clippers unless they are already accustomed to the process. Clippers are prone to damage if they are kicked or dropped.</p> <p>It can be difficult to remove hair from all sides of the lobes of the udder, so focus on hair protruding down past the horizontal plane of the lobes.</p>
Singeing	<p>Carried out with a gas cylinder attached to the wand or torch.</p> <p>A quick and painless method but always ensure that an orange flame is used (not blue) to avoid discomfort. This method is less effective when the udder hair is wet or contaminated.</p> <p>Wave the flame under the udder and ensure that any hair that continues to burn is quickly extinguished to avoid pain to the cow.</p> <p>Use your hand to remove any loose hair after any process to reduce contamination of the laser and thereby the potential cause of alarms.</p>

Whatever method of hair removal is used, you should talk to and touch the cow to let her know that you are there. Avoid surprising the cow to minimise the risk of injury and damage to equipment.

Computer settings

The milking unit has a number of default settings in the computer for many aspects of system management.

These may include:

- Criteria used to determine whether milking permission is granted or not for individuals or groups of cows.
- Automatic drafting criteria.
- Thresholds used to determine milk quality breaches for alerting staff to cows which are more likely to have mastitis or other health issues.
- Thresholds used to determine milk quality breaches for automatic discarding.

- Milking station feed allocations and feeding rates.
- Teat cleaning and udder preparation settings.
- Teat disinfections settings for pre and post-milking.
- Personnel to be called for milking station alarms and/or notifications.
- Alarm notification settings.

- Milking parameters (e.g. pre-milking time, max milking time, post milking time, low flow cup takeoffs).
- Milk destination settings.
- Milking cup attachment strategies.
- System cleaning regimes.
- Milk vat management settings.

It is unlikely that the generic settings will suit all your requirements but initially, you may choose to accept most of the default settings unless your local service agent recommends otherwise. As you develop an understanding of the system you can modify the settings gradually over time. In an AMS the computer detects when there are problems with individual cows.

The monitoring capacity of the milking unit and support software provides production data and alerts you to situations that might fall into any of the following categories:

- Milking frequencies and milk yields across the herd or individual groups.
- Individual cow milking frequencies, milk yields, and feed consumed in the milking stations.

- Cows with attachment problems that might not have been milked out properly at every milking or at the least might be hindering milk harvesting efficiency.
- Cows with early indications of potential clinical mastitis. The tools will be available in the system, make sure they are monitored on a daily basis.

- Cows that are due on heat.
- Cows that require pregnancy testing.
- Cows with a sudden drop in production.
- Cows that are due to be dried off.

With most AMS there will be a series of reports that are readily available for your use. In many instances there is the potential to modify or to create different reports that suit your individual needs.

Different brands of machines will have different functions, alerts and reporting capability. Ensure you become familiar with your machines so that you get the best out of them.



Heat detection and reproductive management

There is no reason that a cow in a well-managed AMS should be more or less fertile as a result of the AMS itself. That said, if you are unable to maintain good cow intakes, cow condition and suitable cow traffic then there is a potential for the herd to be in a negative energy balance or in poor condition.

Heat detection

In a conventional dairy, heat detection is generally carried out at milking time. This is an opportune time as herding encourages cows to express oestrus or ‘bulling’ behaviour. With cows all in close proximity it is easy for staff to look across the herd and ‘spot’ the cow on heat.

Cows have different patterns of movement on an AMS farm and rarely move as a whole herd. This means active searching for oestrus cows may require more conscious effort but it can be integrated easily into paddock tasks.

Critically assess any automated heat detection tool prior to relying on it as anything more than an aid to visual assessment. Ensure that any reported performance levels of the ‘tool’ by the manufacturer or supplier are reliable in your context.

For example, activity meters are a very accurate tool for oestrus detection in an indoor barn-style AMS but may not necessarily have the same accuracy within a pasture-based AMS.

Likewise, an automated tool that is proven to be accurate within a conventional pasture-based system may not be as accurate in a pasture-based AMS where the cows are not moving as a herd and movement is variable and voluntary.

Spotting cows on heat...

Think about...

What are the signs?

Cows on heat tend to move around the system more slowly – they may be the cows that don’t voluntarily move out of the old pasture break and need fetching.

Sexually active groups (SAG) tend to congregate for extended periods and are noticed by staff as a disturbance to normal behaviour (e.g. within the waiting yard).

Use morning and afternoon fetching times to make observations for cows on heat.

As new technology becomes available to assist with heat detection, having an AMS may be an advantage. A farm with two milking units might need two pieces of new equipment but a 14 bail herringbone would require 14 or 28 pieces of the same technology!

Artificial insemination

Assuming that oestrus is accurately detected, the system needs to be able to accommodate the requirement to inseminate the cows in a timely manner.

AI	Think about...
Visiting AI technician	<p>Where an external AI technician is employed cows need to be drafted and ready for the technician.</p> <p>If the technician arrives at 9am effort will be required to ensure that cows are detected, collected and drafted prior to 9am – tedious and time consuming but must be done!</p> <p>If you have a drafting pen adjoined by a small holding paddock, cows detected the previous afternoon or evening can be drafted during the night.</p>
Do-it-yourself AI	<p>If you or your staff are skilled AI technicians then you have more flexibility with detection, drafting and insemination routines.</p> <p>Enter the information into the computer as soon as oestrus cows are detected.</p> <p>These cows can then be included in a draft group and sent to an attention pen or paddock after milking until you return to the dairy to inseminate them.</p>

Controlled breeding program

Synchrony or controlled breeding programs require more work when cows are in an AMS. Such programs are also very disruptive to cow routines with impacts on milking frequency and short-term milk production.

The key reason for the disruption is that a synchrony program requires that cows be injected at certain hours - cows must be brought in and injected or treated as a herd rather than just injecting cows as they present at the dairy throughout the day. This does not mean that such a program cannot be incorporated into an AMS but a clear understanding of the impacts and challenges are required prior to committing to the program.

Pregnancy testing

Pregnancy testing can also be more cumbersome in an automatic milking system.

Pregnancy testing	Think about...
Seasonal herds	<p>Normally all cows are preg tested on the same day.</p> <p>Collect cows in mobs for the vet, then return to the paddock or dairy.</p> <p>As an infrequent/annual task it does not have a large impact on system performance.</p>
Year round or spread calving pattern	<p>Program automatic drafting to capture cows after milking – draft to holding/treatment paddock.</p> <p>Note that a small number of cows may need to be fetched for the procedure.</p>

Use of bulls with AMS

There is potential to include natural mating into an AMS system. Consider the options.

Bull management options...	Think about...
Bulls close to dairy	<p>Holding bulls close to the dairy allows cows to pass through a 'bull pen' as they desire.</p> <p>This was successfully carried out with a small herd of 80 cows as a 'mop-up' bull following 6 weeks of AI in the research AMS herd in New Zealand.</p> <p>A bull pen is also useful if you do not want bulls to have access to the whole herd – set up controlled entry so only selected cows get in and controlled exit so bulls don't get out!</p>
Bulls in paddocks	<p>This option has bulls located on the farm rather than at the dairy.</p> <p>Locate bulls in the 'night' and 'day' paddocks that cows will be moving in and out from.</p> <p>Bulls can be trained to travel to or from the dairy and to move into the milking unit where they are drafted back to the paddock or to the holding yard.</p> <p>If you choose not to train bulls, then you will need to manually move them to new paddocks each day.</p>

Mastitis detection and management

Traditional mastitis detection methods have only limited relevance within an AMS because information about mastitis and milk quality is collected mainly by the computer and not people.

Each brand of automatic milking system incorporates a variety of on-line sensors. These sensors operate in 'real time' at every milking session and generate data relating to the milk quality of individual quarters. These data form the basis of the computer generated reports and automatically generated alerts that farmers need to monitor and act on every day.

The most common sensors measure milk conductivity and milk colour or blood. Some AMS also have an on-line somatic cell counter available as well. Other aspects of the milking may also be recorded and incorporated into the alert system.

These additional parameters may include:

- Peak and/or mean milk flow rates.
- Milk temperature.
- Number of incidences of incomplete milkings, "kick-offs" or "re-attaches".
- Quarter milk yield – this is based on historical data and time since last milking. It is sometimes expressed as a function of the expected yield for that quarter.

Generally the support software allows you to look at summarised data for each parameter rather than raw data which makes interpreting the information easier.

Managing mastitis	Think about...
Using alert lists	An 'alert list' is a list of cows that are more likely to require visual inspection to determine whether or not any clinical signs of infection are present.

Regardless of the type of alerting system generated by the support software, daily monitoring is extremely important to ensure that clinical cows are detected and acted upon in a timely manner.

Managing mastitis	Think about...
Default threshold settings	<p>These settings set the point at which alarms are generated.</p> <p>Defaults can be modified to suit your system.</p> <p>For example, some systems may allow you to set cows for automatic milk 'discarding'. The default settings of this function can be modified to ensure that excessive volumes of milk are not discarded unnecessarily whilst ensuring that high quality milk is maintained.</p>

As you become comfortable with the system and some historical data is generated, alert thresholds should be modified to ensure that their accuracy is maximised.

Watch out for:

- False positive alerts - cows triggering an alert without actually having clinical mastitis.

A large proportion of false positive alerts will cause a level of complacency and less rigorous monitoring. False positives must be minimised so that you maintain confidence in the system, to avoid discarding milk unnecessarily and also to avoid unnecessary physical examinations of cows.

- False negative alerts - clinical mastitis cases are not alerted.

A large proportion of false negatives will cause reduced production and bulk milk quality and has animal welfare implications.

Dealing with the alerts

Different brands of machines will have different capabilities for the physical/visual inspection of suspect cows and the treatment of mastitis cows.

Managing mastitis	Think about...
Dealing with the alerts	<p>Mastitis inspections are best carried out prior to milking when clinical signs are generally easier to detect.</p> <p>Alter computer settings as needed to prevent the cow from milking. The cow should be drafted or 'restrained'.</p> <p>A 'restrained' cow is held in the milking unit for a predetermined length of time (maybe 5-10 minutes) and staff are notified via mobile.</p> <p>Restraining is generally only useful if there is someone within close proximity to the dairy during that period of the day.</p> <p>If no-one attends within the predetermined time, the cow is released without being milked and can be drafted into a holding pen.</p>

If 'restraining' is not a suitable function for your system then either pre or post-milking drafting can be used allowing you to inspect the cow at your convenience.

Treating cows for mastitis

The location chosen for mastitis treatment will depend on the individual preferences and the brand of machine purchased.

Some brands allow for safe and easy access to the udder whilst the cow is standing in the unit. Other brands of AMS may require that the cow be treated outside in a veterinary race or crush to ensure safety is maintained.

It is imperative that treated cows are recorded in the support software and that the milking units are instructed to discard or divert the milk for the period of recommended withholding. It is recommended computer entry is made prior to administering the treatment to prevent memory lapses resulting in antibiotic milk entering the vat.

It is also recommended that the milking stations be set to carry out a rinse or wash after milking all mastitis cows prior to the next cow entering for milking.

This ensures that no residual antibiotics are left in the plant and carried through to the vat with the next cows' milk. It also minimises the risk that bacteria are transferred between cows, although blanket flushing of milking cups at the completion of the milking session should be carried out after all milkings regardless of the destination of the milk.

Concentrate feeding within an AMS

All brands of AMS should have the capability for concentrate feed to be made available to cows during the milking session.

Feeding concentrates	Think about...
Machine capability	<p>Some brands accommodate both dry and liquid supplements.</p> <p>Software should allow the operator to feed different cows and cow groups like early lactation or high production groups, different feed types and allowance levels.</p> <p>Make sure you have the infrastructure for your requirements e.g. additional feed storage silos and augers for any extra feed types.</p>

Feed made available in the milking unit will act as an incentive to encourage cows in but it is not a necessary for the system to work well.

Research carried out in New Zealand showed that cows could be successfully milked voluntarily for an entire lactation with no feed allocation in the milking unit.

Cows that are generally fed in the milking station might be reluctant to enter the station for a short period if their feed allocation is removed suddenly.

It is important to remember that a fast milking cow might not be able to consume the same amount of feed as a slow milking cow. Actual feed intake will depend on the cow's feeding rates and the total amount of time that cow spends in the unit each day.

An automatic milking unit is an expensive piece of capital to be used primarily as a feeding station!

Feeding concentrates

Think about...

Automatic feeders

If some cows are expected to consume large volumes of concentrate on a daily basis, then consider automatic feeders.

For example, if you are hoping to maintain group average daily concentrate consumption levels above 5-5.5 kg per cow per day during early lactation then additional concentrate could be made available in automatic feeders.

If concentrate feeding is part of your system then it is a good idea to ensure that cows get at least a small allocation of feed at every visit during periods of training and adaptation.

This provides a positive reinforcement while cows settle into the system. After that, you can withdraw access to feed at some milkings without a problem.

Fodder crop caution

With a distributed milking pattern there is a slow 'trickle' of cows into and out of paddocks. This does not generally pose a problem but keep in mind that when small numbers of cows are accessing forage, toxic levels of intake may result.

For example, cows accessing a paddock of lucerne in a conventional system can be closely monitored for the critical period after milking to detect any symptoms of bloat. This is more difficult with an AMS.

Different strategies may be required to successfully graze some crops like brassicas in an AMS. Cows would normally access the crop as a large herd. Re-think how you will manage this and any post-grazing residuals.

Section Three: Making the Transition

The secret to a successful transition from conventional farming to an AMS is planning, planning and more planning!

3



Section Three: Making the Transition

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Planning for a good start-up

The secret to a successful transition from conventional farming to an AMS is planning, planning and more planning! In essence you are aiming for a short transition period and minimal stress for both people and cows. You should also aim for a limited drop in milk production, no deterioration in milk quality and rapid adaptation by the cows – a tall order by any standards but one that can be achieved with careful consideration of key issues and a well organized timetable of action.

Before you begin...

Before you rush out and order your machines, think through the following issues.

Get dairy layout right

Time spent getting the dairy layout right is well worth it. It is imperative that the layout allows for good cow flow and voluntary cow movement. This is important for all milk harvesting facilities but even more so when cows are expected to move around unassisted.

Once you start using the dairy, if there is something that causes problems or requires modifying then organise to have it altered as soon as possible. Many animals will be trained in this dairy over its lifetime.

The quicker the adaptation period, the lower the cost in the long run in terms of lost production and labour required to assist cows struggling to adapt.

Factor in lost production

You would be naïve to think that changing from a conventional system to an AMS will have no impact on production. Expect a 5-10% drop in milk production during year one as the cows and staff develop an understanding of the system.

Think about the impact that the timing of the change-over will have on production. Production drops as cows move through the stages of the lactation and cows are easier to train at some stages than others. Consider the implications for the bottom line.

Make sure you factor in first year production losses into any economic evaluations and cashflow predictions.

Stage of lactation at change-over...	Impact on production...
Late lactation	<p>Training cows in late lactation is ideal because while cows can be difficult to motivate to move, production is already low.</p> <p>Training at this time means they will have well-established movement habits by the start of the next lactation.</p> <p>This will not be an option for those desiring a quick changeover from old to new dairy.</p> <p>Suitable only for seasonal calving herds.</p>

Stage of lactation at change-over...	Impact on production...
Early lactation	<p>Early lactation cows are the easiest cows to train because they have strong appetites and feed incentives work well.</p> <p>High levels of motivation mean cows learn faster as they are more inclined to explore in search of fresh feed.</p> <p>Note though that there is still about a 5% reduction in lactation performance for the season compared to the previous and subsequent seasons.</p>

Stage of lactation at change-over...	Impact on production...
Mid lactation	<p>Mid lactation cows are more difficult to train than early lactation cows.</p> <p>With half of the current lactation in front of these cows, poor training will result in slow adaptation and quite a loss of production. In addition, many cows may be dried off early due to low production.</p> <p>Staff have to remain vigilant to ensure that mid lactation cows adapt to the system as quickly as possible.</p> <p>Expect cows trained in mid-lactation to have a lactation production level about 5-10% lower than previous and/or subsequent seasons.</p>

Stage of lactation at change-over...	Impact on production...
Dry period	<p>Training cows when they are dry aims to achieve cow adaptation to the system during a period when milk production is unlikely to be negatively impacted.</p> <p>Dry cows have very low levels of motivation so feed incentives are less effective. This means labour is required to encourage cows to the dairy.</p> <p>Train dry cows for short periods only so that cows are not taught to expect just a 'pass through' and a feed of supplement without receiving a milking.</p> <p>Two weeks is the recommended period for training dry cows.</p>

Prepare staff well

It is important that all staff are trained well and have realistic expectations about the AMS and the commissioning period.

Staff issues	Think about
Preparing staff for change-over	<p>Let your staff know well in advance of the change to an AMS.</p> <p>Discuss their concerns and if possible, visit an existing AMS to see systems in operation. Make sure staff understand what makes an automatic system work well.</p> <p>Discuss the timeline to start-up in detail – display a ‘calendar of events’ for all to see.</p> <p>Provide computer training and practice reading and interpreting computer generated reports.</p> <p>Create a list of “What to do if...” scenarios and ensure everyone is clear about the action to take.</p> <p>Set high standards for cow handling – gentle encouragement, patience and tolerance. Outline why there is no place for yelling, hitting etc.</p>

Staff attitudes and behaviours are particularly important at commissioning and during the training periods.

If staff ensure the experience is positive for the cows, they will adapt to the system quicker.

Recognise that walking away from a yard full of cows and idle milking units in the early days of training will be very difficult for you and your staff.

Remember though that continuously encouraging cows through the milking unit just prolongs the adaption period. In this case, it is best to walk away for an hour then go back to check if there are cows moving through the system voluntarily, then walk away for another hour and so on.

Carefully interpret the situation and the cow behaviour before you intervene. If cows stand in the waiting yard with no access to food or water for many hours this will impact on the speed of adaptation as well so take appropriate action to encourage cows through if need be.

Emphasise to staff that cows should never be restricted in their ability to move around the system.

For example, never lock them in their paddock or an area of the system as they will struggle to understand that ‘sometimes’ they can move freely around the system, but ‘not always’.

Timeline to start-up

A detailed timeline to start-up or calendar of events helps everyone involved anticipate the challenges and makes the transition from conventional farming to an AMS free from unpleasant ‘surprises’.

6-12 months before start-up

Planning related to...	Think about...
People	<p>Consider family or other factors that may affect the timing of the start-up.</p> <p>If possible schedule holidays now so no one is due for leave during the months either side of start-up.</p> <p>If you and/or your staff are not familiar with computers, start taking lessons now.</p>
Herd	<p>Plan the breeding program so you achieve the desired calving spread leading into the commissioning period.</p> <p>You may consider spreading the calving pattern to ease the work load during start-up or to make more efficient use of the milking units in the longer term.</p>
Facilities	<p>Plan the construction and/or renovations needed to accommodate the AMS units.</p> <p>Ensure that all required services are available eg: phone line for robots to generate alerts, suitable power supplies - check phase and voltage with manufacturer.</p> <p>Ensure the “old” milk harvesting equipment is maintained properly until its decommissioning.</p>

It is not worth the heartache of starting the AMS dairy with a high level of mastitis. It is false economy to reduce the frequency of liner changes or cut back on machine maintenance or servicing of the conventional dairy leading up to the AMS commissioning.

It may also be worth developing networks with other AMS users to learn from their experiences.

Your AMS supplier should be able to put you in contact with other farmers that have installed AMS units.

Staff at FutureDairy can also with help with this – consider joining the FutureDairy on-line chat forum.

3-6 months before start-up

Planning related to...	Think about...
People	All staff to be involved should start getting familiar with management software and basic touch screen operations.
Herd	<p>Identify chronically infected cows with contagious mastitis (<i>Staph aureus</i>) and resolve herd mastitis problems prior to start-up. Do the same for lame cows and any other sick cows should also be treated prior to start-up.</p> <p>Start udder shaving or singeing as it is best not carried out when the cows first enter the milking unit - it adds to the stress cows may be already experiencing.</p> <p>Tail trimming and udder singeing can often be carried out efficiently in a conventional milking parlour.</p>
Facilities	Read equipment and software manuals. Follow up any queries with equipment supplier.

Pre-selecting cows based on udder conformation is not recommended.

Different brands of machines cope with different udder conformations so it is not possible to make general, blanket recommendations. Instead, bring all types of udders to the AMS dairy and let the machines tell you what conformations are not suitable. This saves time and the unnecessary culling of some cows.

1-3 months before start-up

Planning related to...	Think about...
People/Facilities	<p>Read your AMS manual and become familiar with:</p> <ul style="list-style-type: none"> • All safety precautions. • Start, restart and shut down functions. • Switching machine between automatic and manual modes. • Using management programmes and touch screens. • Management of milk cooling and milk collection/tank cleaning procedures. <p>Finalise daily routines and procedures for handling alarms.</p>

It is worth being aware though that there may be a small proportion of cows whose udders are not suitable – just as is the case in any dairy operation.

1-2 weeks before start-up

Where possible ensure that all aspects of the new installation are completed prior to introducing the cows into the system. Incomplete buildings, laneways and/or surrounding infrastructure will make your life more difficult and introduction more stressful for the cows.

Planning related to...	Think about...
Herd	<p>Think about the likely grazing rotations for start-up week.</p> <p>Consider changing the time of milking routines to help cows start falling out of their twice-daily milking habits.</p> <p>Where possible allow cows to start moving through the new dairy and maybe access feed in the milking unit.</p> <p>Allow cows to explore and become experienced with one-way gates. Free movement from the paddock to the dairy may also be helpful.</p>
People	<p>Sort out work roster but make sure everyone is prepared to help out. Flexibility is critical to cope well with the unforeseen.</p> <p>Ensure all staff are well rested and prepared for the start-up.</p>

Thorough start-up planning results in the best chance of a smooth and relatively stress-free commissioning of the new dairy.

Be informed, prepare for the worst but expect the best, and ensure that your staff are prepared and guided.

If the new dairy is in a different location to the old dairy then carefully consider which paddocks should be grazed during the initial stages of the commissioning.

If cows are grazing close to the old dairy then you may find that they stand at a gate trying to head in that direction. Choose paddocks with orientations and locations that minimise the impact of this to assist with the adaptation period.

If you are expecting cows to enter and exit paddocks from gates in locations that they have never used before, don't be surprised if you find the herd waiting at the old exit gateway even when the feed in the paddock is well and truly depleted!

Commissioning the dairy and training the herd

Buckle up! This period may be tough going and a steep learning curve for your cows, you and your staff. The process of de-commissioning the old dairy and commissioning a new one is complex and challenging to say the least but the preparations you already have in place will help. Pay particular attention to training batch size and pasture allocation in this hectic period.

Training batch size

If the new dairy is commissioned during a 'dry' period (when all cows are dried off in a seasonal herd) then training will be dictated by calving spread but for training occurring at other stages, there are two main training batch size options.

1. Initially train only a small group of animals
 - about 10 per milking unit.

This allows full commissioning of the machines and downtime to modify machine function. You don't need the pressure of having to achieve a high number of milkings per day in the early stages. These cows will also assist in training the subsequent batches/groups of cows that will join this group in approximately 4-7 days.

2. If the majority of the herd is in milk, train large groups of animals after the initial small group.

While it may be very daunting and depending on the herd size and the cow/machine ratio, it is possible to train the remainder of the herd in one batch.

This approach reduces the length of time necessary for training of the entire herd and may minimise the time in which cows are being milked through two facilities (the conventional and the AMS).

You can choose to train the remainder of the herd in one group or introduce 30-40 animals per machine first, then a further 10-20 cows per unit in a final group.

The final group is the most difficult to work with as the competition for machine time is greatly increased. It is important that you minimise any negative impacts on the existing herd (e.g. long waiting times) to ensure that they do not reduce their willingness to visit the dairy.

You would expect for example, that if each group is introduced to the dairy on a Monday they should be well settled by the following weekend. This allows the majority of staff to take time off to revive and prepare for the next week.

Pasture allocation

In the first week of commissioning or when training a new batch of cows, ensure the amount of feed made available in any one location is kept to a minimum.

You may need to reduce pasture allowances and increase access to feed on a post-milking feedpad to provide a strong incentive for cows to leave the paddock and voluntarily explore the system. In a less intensive system, you may need to offer three small pasture breaks per day to ensure that cows regularly deplete their pasture within a given paddock.

Your aim is to reward cows that voluntarily move around the system with a fresh allocation of pasture. To get to a fresh break, cows should have to move through an automated drafting gate and may require milking prior to being released to the fresh pasture.



Further Information



This is the first version of management guidelines for pasture-based AMS farms. We plan to have all future versions of these guidelines made available on the FutureDairy website (www.futuredairy.com.au).

Whilst we have made an honest attempt to document all of our current knowledge regarding pasture-based AMS farming, we are still learning too! We encourage you to keep abreast of the issues and insights arising out of our research by checking the FutureDairy website regularly. You may also wish to join our email discussion group for help and advice from experts and other AMS farmers.

Check out the following:

www.futuredairy.com.au

Access online information and make direct contact with the team at FutureDairy.

www.dairynz.co.nz

Access information regarding the AMS research carried out in New Zealand and to make contact with the Greenfield team.

Your local AMS dealer or manufacturer is a great source of information and can put you in contact with others who have purchased similar equipment.

We hope that this guide has helped prepare you for this new way of farming so you can capture the benefits and enjoy the rewards that the 'AMS adventure' has to offer.

Good luck!

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