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AMS Generalities

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 **AMS** = Automatic Milking Systems (also known as robotic milking)

2 The first commercial AMS installation took place in the Netherlands in 1992. They arrived in Australia in 2001. Today there are AMS in every dairy State across Australia!

3 The Australian dairy industry has heavily invested in supporting AMS adoption mainly through the FUTUREDAIRY and Milking Edge Projects.

4 **AMS is suitable for most dairy systems:** pasture-based and indoor systems, small and large, seasonal or year-round!

5 **Milking becomes a background operation.** The entire milking process—cow identification, teat preparation, cup attachment, milking, cup removal and disinfection—occurs without direct human intervention.

6 Most AMS can also feed cows during milking, divert milk automatically, perform herd testing and rinse or wash themselves!

7 Cows traffic to the dairy (and get milked!) voluntarily and they do so **distributed throughout day and night** (24/7!). Feed is the main incentive used to encourage cow traffic to the dairy.

8 AMS impacts different farm management areas including daily practices and farm routines. **You will now have more time available to prioritise other areas of the business** and you will have a lot of the data available to make better decisions!

9 **Staff are still required on-farm** as there are still many tasks to be done (such as allocating feed, calf and heifer management, monitoring animal health and taking care of breeding).

10 Adopting AMS involves a learning curve and every farmer captures the opportunities AMS might offer in different ways!

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Incentive management in AMS

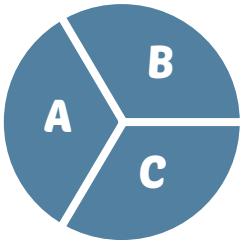
Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 The farming system (pasture-based or indoors) has a strong impact on cow behaviour. But in both systems, **feed is the main incentive to encourage voluntary and distributed cow traffic to the dairy.**

2 A small number of AMS farms decide to operate in batch milking or semi-voluntary mode throughout the entire year or during certain times.

3 The basic of feeding cows and the total herd requirements do not change with AMS. But farmers learn to manipulate **type, frequency, timing, size and location of feed to manage cow traffic** in order to ensure milk production and system utilisation targets are achieved.

4 Most pasture-based AMS farms are **divided in 3 areas that are allocated to cows over a 24h period.** In some cases farmers might also decide to offer their cows access to either 2 or 4 allocations.



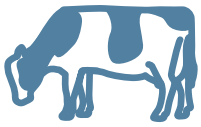
5 Depending on the season, feed availability or herd requirements, **farmers might also need to offer their cows access to supplementary feed** (such as hay, silage or a PMR). This might be offered in the paddock or in a separate feeding area. If this replaces a grazing allocation, farmers will have to provide access to a loafing area.

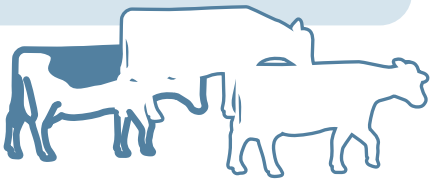
6 **Farmers can also offer concentrates** (pellets or meal) or grains in the robot and/or external feed stations.

7 In indoor AMS farmers can choose to have:

- **Free cow traffic**: no separation between resting, feeding and milking area, the feed offered in the robot becomes the driver to visit the robot.
- **Guided cow traffic**: separation between resting, feeding and milking area, the fact that cows perform their daily activities in bouts becomes the driver for them to visit the robot.

8 There will always be a proportion of cows that have not visited the dairy within an expected timeframe, and will therefore have to be fetched (to avoid long milking intervals that have a negative impact on milk yield and udder health).





9 Farmers highlight the importance of consistency or routine but also of flexibility to **manipulate different incentives** in order to make the system work.

10 **Other factors** such as weather, drinking water availability and social behaviour all impact on cow traffic to the dairy.

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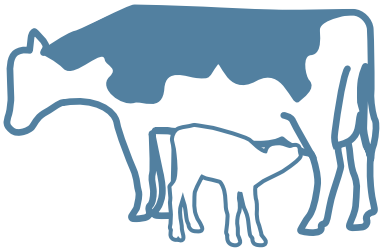
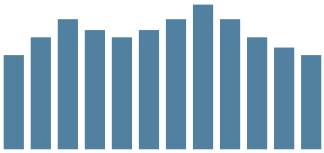
Reproductive performance in AMS

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 The importance of good reproductive management and the key concepts behind it will not change!



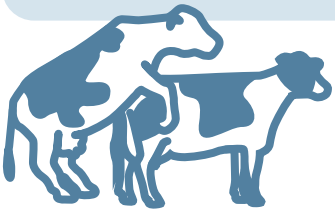
2 You will not see every cow, every day, at set times. You will have to find new ways of identifying and dealing with cows that require your attention! **Good data records and a good sorting area** with access to water, feed, shade and loafing will be key to this!



3 You do not need to change your calving pattern when moving to AMS, but ensure that there is **enough capacity** to milk the maximum target number of cows at peak!

4 **Keeping cow records updated and accurate** will ensure the system works effectively. Good data will also help you take better decisions.

5 **Visual observation will not be your primary way of detecting cows on heat.** It is likely you will now rely on traditional (such as paint or mount detectors) and automated aids (such as activity and rumination meters and inline systems). Still keep an eye on the herd when wondering around the farm!



6 You can set up your system to automatically draft cows that are suspected to be on heat.

7 Although most farmers choose to AI their cows, you can still use a bull in AMS (the collars will work on them too!)

8 **Breeding objectives in AMS** might put a bit more focus on udder conformation, teat placement, milking characteristics as well as feet and legs.

9 **Monitor fresh cows closely** as you would in a conventional dairy. Pay attention to their visitation pattern, milking performance and concentrate intake. Remember most AMS will allow you to dump or divert milk automatically.

10 Make sure you spend some time **training heifers and new animals**. It pays off! Gentle encouragement and patience are key to the process!

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Milk quality and herd health

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 AMS farmers can achieve excellent milk quality and health results due to the combination of excellent farm management skills, use of technology and good facilities and equipment.

2 Sensors can measure changes in milk and cows' body or behaviour. This data helps identify cows that require your attention and make informed decisions!

colour, conductivity, flow or yield

weight, activity or rumination

3 You will have to draft cows that requires inspection or treatment. The area should have access to feed, water and rest as you will not always be around when they visit the dairy.

4 The milking process occurs at a quarter level which has a strong positive impact on udder health. But milkings with very long intervals (> 16h) can have a negative effect on udder health.

5 Many AMS farmers report a decrease in lameness incidence due to voluntary cow traffic and a reduction of time cows spend on concrete.

6 Milk lines and cooling system are designed to manage lower volumes of milk at any given point in time distributed throughout the day. Think about the design and use of milk filters, plate coolers and buffer vats!

7 AMS can automatically divert milk to alternative destinations (drain, buckets or vats), based on certain measurements taken by sensors during milking.

8 Bucket cows can still traffic with the milking herd and have their milk diverted away from the main vat. Ensure these cows are identified as such in the software! The robot will normally rinse or wash after they have been milked.

9 Internal plant cleaning is mostly automated and conducted 2-3 times per day. External components of dairy plant as well as hosing of dairy and yards is usually a manual task. Schedule these at times when there is less cow traffic through the dairy.

10 You can change various wash/rinse settings for cups, robot units or whole plant to reduce the bacterial loading between cows and between full plant washes.

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AMS labour and farm routines

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 **Milking becomes a background activity** as most of it is taken care by the robot.

2 You should have more time for other tasks and general farm business management!

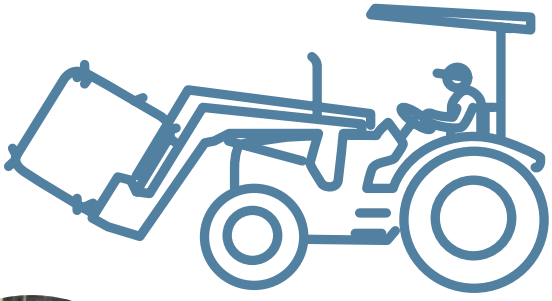
3 There is a reduced physical workload.

4 **Greater flexibility** in the start and finishing times as well as organisation of daily routines .

5 Potential for improvements in **labour efficiency** (such as less labour required, more cows with same labour units, shorter working days)

6 You need to be **prepared for call-outs** at any time, as robots operate 24/7. Share the load with the team!

7 If you take care of your robots through good maintenance and cleaning, you can avoid incomplete milkings (or failures) as well as increased call outs and alarms.



8 An AMS farm is still a dairy farm and the **basic skills and knowledge** around dairy farming remain the same!

9 Many tasks on-farm will not change much, others will change how you do them, some you will not have to do anymore and others will be new tasks! **Be flexible and prepared to learn new things!**

10 You will spend **more time in front of the computer** (or mobile!) either on the farm or at home entering data, finding cows that need your attention and monitoring performance! Farmers report spending an average of 40 minutes per day at the computer.

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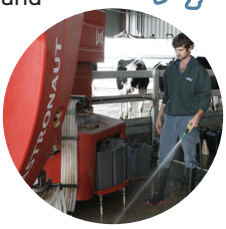
Infrastructure and planning

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 In an AMS layout has an impact not only on cost but also on cow traffic and people's routines.



2 In pasture-based AMS think about number, distance, location, size and shape of paddocks during the planning stages!

3 In indoor AMS, cow traffic (free or guided) will impact farm layout.

4 More laneways gives you extra flexibility to manage cow traffic. Split laneways are a solution when you can't add extra laneways.

5 Different gate types are used to direct cows to certain areas, avoid them going back or to encourage cow movement in one way.

6 Think where and how you will be feeding your cows: in the paddock, at the robot, in feed stations or on the feedpad.

7 Type, number and configuration of robots are important. Consider leaving some extra space for expansion in the future!

8 There are some options around milk transfer lines including the use of filters, plate coolers, vats and diversion lines.

9 Plan the waiting yards and sorting areas to suit your management preferences.

10 Spend time planning your layout! Visit AMS farms, talk with equipment providers and your farm team to find what works best for you.

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Assessing System Performance

Developed by Sarah Legge,
Project Officer Dairy, NSW DPI

1 You can't manage what you can't measure.

2 In AMS you rely more on data captured by various sensors to understand what is happening on the farm, with your robots and your cows.

3 Complement the data in the system with your understanding of what is happening on-farm.

4 Most farm KPIs (Key Performance Indicators) will be similar to conventional milking systems.

5 You will now also have cow and robot KPIs related to cow traffic, milk production, milking behaviour, concentrate intake and robot utilisation.

6 Most KPIs are interconnected and they are impacted by cow, system and/or robot factors!

7 You will manage cow traffic to achieve a desired milking interval (or milking frequency) that aligns with your production targets.

8 Try to minimise the number of milking failures, stop alarms and call outs.

9 Try to maximise robot utilisation (in kg milk harvested per robot per day) by manipulating number of cows, cow traffic, milking frequency and milk yield.

10 Manage your farm system to achieve your production, profit and lifestyle goals!

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Economic performance of AMS

Developed by Juan Gargiulo,
Development Officer Dairy, NSW DPI

1 In Australia, productivity (milk per hectare, per cow and per labour unit) and profitability (ROTA or EBIT) of pasture-based AMS farms is similar to that of CMS.

2 There is a high variability in productivity and profitability between farms (both in AMS and CMS).

3 Cost is not the only factor driving an investment decision. Every system and configuration choice will impact management and cost structures.

4 AMS tend to have higher capital costs that are impacted by the capital invested, interest rates/opportunity costs, lifespan of the robot and subsequent operating cost.

5 Shed costs and repairs and maintenance are usually higher for AMS, but they can be managed.

6 The additional costs for AMS can be balanced out by potential labour savings, improvements in pasture utilisation, animal health or milk production.

7 AMS can also improve routines and lifestyle (more flexible and less physical) and allow more time for better business management!

8 The efficiency of the system, determined mainly by labour efficiency (milk/labour unit) and milk harvested per robot, will impact overall profitability.

9 The main way to increase milk harvested per robot is to milk more cows per robot, but it can also be done by increasing production per cow.

10 Use tools like DairyBase to understand performance and partial budget calculators to compare expected costs and benefits of different investments.

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