July, 2020

Automated Milking Systems (Milking Robots)

Sylvain Quiédeville, Heidrun Moschitz, FiBL

Automated Milking Systems (AMS) are connected agricultural robots which can assist farmers in their daily work. AMS support the implementation of a fully autonomous milking process. In addition, these systems help to monitor milk quantity and quality, and most models track cows' health.

The Milking Robots allow farmers to choose their preferred milking process and to define the timings.

An AMS can reduce the workload of agricultural workers and increase management efficiency, whilst the monitoring dashboard can be used as a decision-support tool. In practice, the AMS generates key relevant data on the milking process and also on cows' well-being in most recent models.

AMS uses a set of digital technologies, including cameras and sensors to guide, monitor and milk cows. The monitoring system helps optimise performance parameters during operation and, in some models, to detect early signs of mastitis (inflammation of breast tissue). Some models also allow, if desired, a service partner to access the automatic milking system remotely, for online diagnosis.

Application scenario

Enhanced milking process for optimisation of farm organisation and management

Digital technologies

Robotics, sensors, cameras, smartphone

Socio-economic impact

- Economic: milking efficiency, milking facility, performance, labour costs, investment costs
- Social: reduced workload, milk quality, reduced human-animal interactions, potentially declined farmers' skills on observation of animals
- Environmental: mastitis detection using non-chemical agents, animal welfare

Examples of AMS models:

GEA R9500:

https://www.youtube.com/watch?v=Si-y7xBUKLc

https://www.gea.com/en/products/milking-farming-barn/dairyrobot-automated-milking/dairyrobot-r9500-robotic-milking-system.jsp

Fullwood M2erlin :

https://www.youtube.com/watch?v=8e9twagPHKw

Lely Astronaut A5:

https://www.youtube.com/watch?v=5cWiEp10ruA

DESIRA receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818194. The content of this document does not reflect the official opinion of the European Union. Responsibility for the information and views expressed therein lies entirely with the author(s).

Purpose of the tool

Automated Milking Systems (AMS) have primarily been developed to implement a fully autonomous milking process. The robotic system allows an operator to choose the preferred milking process and to define the timings. It welcomes cow after cow and helps farmers in managing every lactation step. The objective is not only to reduce manual work to milk cows, but also to automatically monitor milk quality and, in most recent models, cows' health.

Source: Lely; © Anoek 2012

Description of the tool

Farmers can change the settings of the AMS and receive key data on the milking process and also, in most recent models, cows' health. The milking stall module works independently, day or night. Some AMS models can perform several operations in a single attachment: stimulation of the teat, teat cleaning (or pre-dipping), drying, prior stripping, milking and post-dipping. This single process is supposedly key to harvesting excellent quality milk, while maximising the efficiency of the robotic milking facility.

The monitoring system allows farmers to screen milk quantity and quality and to optimise performance parameters during operation, keeping them informed (in some models, via text messages) about deviating values. Deviating values might indicate a sign of disease. Some models allow, if desired, a service partner to access the automatic milking system remotely, for online diagnosis.

Some AMS models include a cell count sensor over which the milk continuously passes from the beginning to the end of the milking process, for the analysis and early detection of mastitis (inflammation of breast tissue). This cell count system does not require the use of chemical agents. It helps farmers to detect the disease at a very early stage, thus helping to minimise treatment time, safeguard the healing process, and ensure the continuous productivity of the healthy herd.

Finally, some AMS models include an integrated guidance system, leading cows to a range of possible gates and to an exit, as soon as they leave the box after milking. Other models are based on free cow traffic, where cows can decide themselves when to enter the system and be milked.

Areas of socio-economic impacts

Social	Reduced workload; presumably higher milk quality; reduced human-animal interactions, and potentially less time spent by farmers on observing animals, possibly leading to a decline in their observational skills
Economic	Increased milking efficiency; decreased labour costs; high investment costs
Environmental	In some AMS models, mastitis detection without chemical agents that positively affects animal welfare