
Electricity and water consumption by milking

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Large milking parlours with more techniques and the introduction of automatic milking systems (AMS) in Denmark have brought an increase in the consumption of electricity and water in connection with milking. It is important to optimise all subcomponents to get the most out of the investment in a milking system. By regular monitoring of the consumption, one can react quickly if it deviates from the normal consumption.

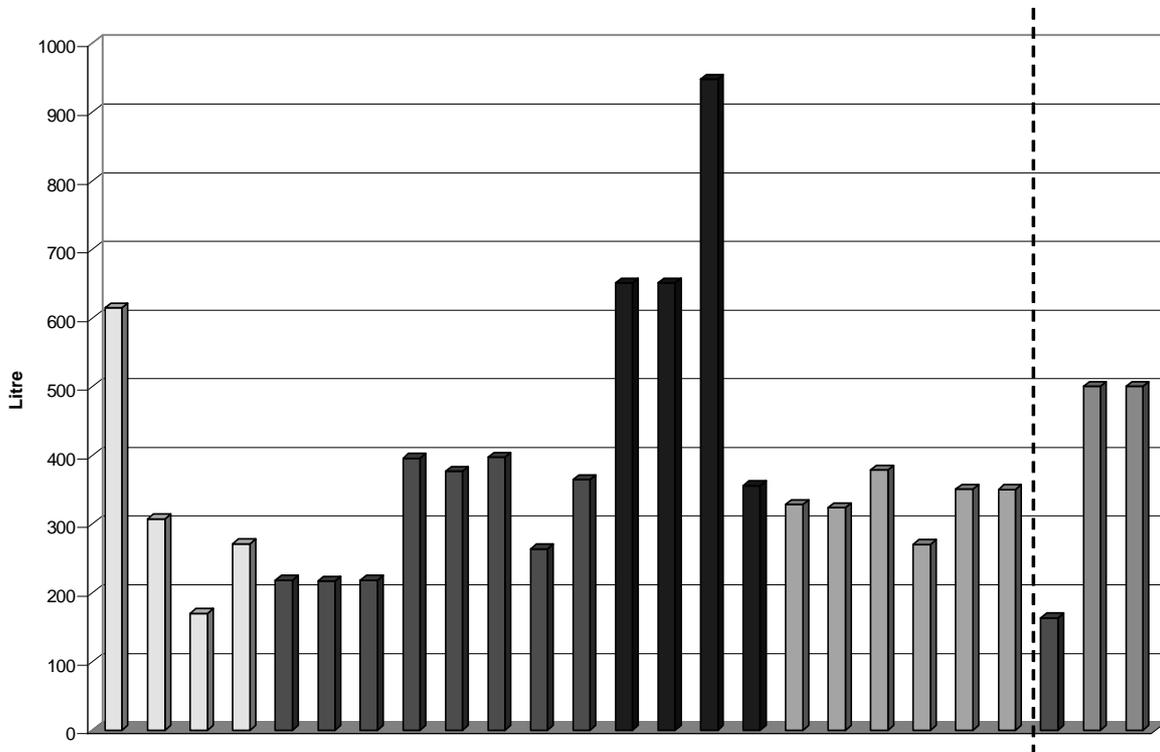
High electricity consumption leads to high electricity costs. High water consumption results in high costs of water, waste water storage and subsequent application to fields. Waste water storage costs amount to app. 2 Euro per m³, and field application costs amount to app. 2 Euro per m³.

Previous Danish measurements of electricity and water consumption in connection with AMS have shown a high electricity consumption. Especially, the electricity consumption of DeLaval VMS was at a very high level. Moreover, the 24-hour water consumption varied considerably.

The milk quality depends on many different factors. One of these factors is hygiene including washing of the milking system. It is important to wash the milking system thoroughly by means of water and chemicals in appropriate quantities, neither too little nor too much. The use of CIP washing systems (CIP = clean in place) can reduce the washing costs considerably. The CIP washing system reuses some of the wash water, and hence it is possible to reduce the consumption of water among others. However, the CIP washing system cannot yet be used to clean AMS. This is a future development task for the companies.

The purpose of this FarmTest was to determine the electricity and water consumption at milking. It was primarily interesting to monitor the consumption in connection with AMS as this type of milking takes place day and night and hence water and electricity are used continuously.

of the AMS with the lowest energy consumption. The electricity consumption of the 40-stall rotary milking parlour was at 37.7 kWh per ton of milk.



- Farm 1-4: Galaxy Automatic milking system
- Farm 5-12: Lely Astronaut Automatic milking system
- Farm 13-16: DeLaval VMS Automatic milking system
- Farm 17-22: Gascoigne Melotte Automatic milking system
- Farm 23: 2x12 herringbone milking parlor
- Farm 24: Rotary milking parlour, internal, 26 stalls
- Farm 25: Rotary milking parlour, external, 40 stalls

Figure 1. Water consumption per ton of milk.

The water consumption should be optimised and kept at as low a level as possible. A high water consumption results in high costs of water storage and application to fields and costs of water if it is from public water supply.

Water consumption

The number of system cleanings and unit flushes has a great influence on the water consumption. The system is typically cleaned three times every 24 hours, i.e. every eight hour. However, some chooses only to wash the milking system two times every 24 hours. Fewer system

System cleaning and unit flushing

Automatic washing of milking box floors can be necessary to maintain a good hygiene. However, it also requires a great deal of water. This FarmTest has shown an average 24-hour consumption of 278 litres per milking box with automatic floor washing.

Floor cleaning

It is important to fine-tune the system to wash the floor when necessary only. Typically, the floor washing frequency depends on the number of milkings. An example could be floor washing every fifth milking.

The greatest "consumers"

The greatest „electricity consumers“ in connection with milking is the vacuum pump, compressor, electric water heater and automatic washing system (in the mentioned order).

Electricity consumption

Frequency-controlled vacuum pumps

The FarmTest showed that the use of frequency-controlled vacuum pumps reduces the energy consumption considerably. For example, the test of DeLaval VMS showed a 20 kWh difference per 24 hours between frequency-controlled and non-frequency-controlled vacuum pumps.

At a 24-hour electricity reduction of 20 kWh, a frequency control price of DKK 15,000 and a seven per cent interest rate, it takes app. 4.8 years to repay the frequency control.

Compressor

Leaks in the air system and too high working pressure can be some of the reasons for a high electricity consumption on the compressor. It is important to monitor the electricity consumption continuously by means of manometer and hour meter mounted on the compressor. These should be supplemented with a measuring of the leaks in the system.

Electric water heater

Heating of water is energy consuming, and hence the system should be adjusted. Firstly, the water should not be heated more than necessary, and, secondly, the amount of water heated should be adjusted to the consumption. Preheated water from heat recovery systems can also contribute to reducing the electricity consumption.

Automatic washing system

Some of the automatic washing systems are provided with an integrated water heater. Thus a good deal of energy is used for heating the water prior to cleaning the milking system.

In the FarmTest, defects on milking units of all AMS brands were found. When installing a milking system, electricity and water meters should be installed on all supplies to be able to monitor the consumption from the outset.

Defects of new systems
