

The energy efficient dairy

Milking equipment is often a major user of energy on a dairy farm. Assessing the way this equipment uses electricity can reduce overall energy costs.

Maintaining and replacing existing equipment

A low cost way of reducing your energy use is by maintaining existing equipment or replacing old equipment with new. Newer equipment has improved technology and can save you money by possibly reducing the energy needed to heat water for cleaning, cooling milk or milking cows. This step involves greater capital expenditure, but with adequate assessment and planning this outlay can usually be paid back within a reasonable timeframe.

Hot water

Water heating can account for up to 40% of the electricity used in dairy farms, although the percentage cost can be less due to the low cost of hot water tariffs, especially if OffPeak tariffs are used.

Maintaining equipment efficiency

- Check thermostats are not set too high, causing the water to boil.
- Insulate hot water systems (including pipes).
- Ensure there are no leaks in the hot water system.

Heat recovery from milk

The heat removed from the milk of 200 cows in one day is equivalent to heating 1,500 litres of water from 15°C to 95°C. Heat can be recovered from milk by:

- **Warmed water from a pre-cooler**
By installing a pre-cooler you recover the heat from milk, which in turns heats the water. The water temperature can get to 30°C, depending on milk and water flow rates. This can be used to feed the hot water system.
- **Installing a thermal heat recover system**
This system is fitted to vats that use an air-cooler condensing mechanism. It is connected to the refrigeration line between the compressor and the condenser and utilises the heat transferred from the compressed gaseous refrigerant to heat water. The amount of water heated this way should be enough for cleaning. Excess water can be used for udder washing, general washing, showering or even floor heating.

Energy efficient milk cooling

Check that your cooling equipment is clean and undamaged especially making sure that cooling fans are clean and refrigerant gas levels are adequate.

Pre-cooler

If a pre-cooler is installed it can reduce dairy energy use by 20–40%. Milk and water flow in opposite directions and the heat from the milk is transferred to the water through stainless steel plates. Cooling the milk before it enters the vat reduces the energy and time needed to cool the milk further.

To maximise performance of a pre-cooler ensure:

- A large enough heat exchanger or 'plate' is used.
- Water flow rates are higher than milk flow rates.
- The cooling water is as cool as possible.

Double stage pre-cooling systems

The first stage uses cool water from a dam or bore and the second stage uses chilled water/glycol to cool milk down to 4°C. The chilled water can be produced on demand or overnight on OffPeak rates.

Chilled water can be produced a number of ways.

1. Cooling towers

- Cools water by transferring heat from water into the air.
- Requires a large tank.

2. Thermal stores

- Cools water overnight using OffPeak discounted rates.
- Store in an insulated tank for use the following day.

3. Ice banks

- Generates ice along evaporator coils during OffPeak times.
- During milking, water is circulated from the ice bank to the pre-cooler back to the ice bank to be chilled again.
- Requires less space than a thermal store.

4. Instant chillers

- Uses a refrigeration system for immediate use in the pre-coolers.
- Takes up less room than other systems.
- Does not take advantage of OffPeak rates.

Double stage cooling units are used on larger dairies where the expense of the unit can be recouped through lower energy costs due to the OffPeak rates.

Contact your dairy or refrigeration specialist to see if a double stage cooling unit is suitable for you.

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