

Milk cooling



Milk cooling will be consuming 20 to 30 per cent of dairy shed energy consumption, and often when you are not utilising your solar PV panels. Therefore, it needs to be done as efficiently as possible.

How efficient is your cooling system?

Could you easily save serious money on a better cooling system?

Milk needs to be cooled by 31°C. The cost of cooling is around \$3.50 per kilolitre (kL) if done only with a refrigeration system [assuming electricity is charged \$0.25 per kilowatt-hour (kWh) and the refrigeration coefficient of performance (COP) of 2.5]. However, if pre-cooling is included the cost drops to around \$1.75/kL.

Pre-cooling using a plate heat exchanger and cooling water from a river, dam or bore should be cooling the milk to less than 2°C of the incoming cooling water temperature. See Figure A below to see how much a 1°C improvement in pre-cooling could save you.

For a dairy producing two megalitres (ML) per year, the saving is approximately \$290 for each degree of improvement. Many farms audited in the Victorian Government's recent Agriculture Energy Investment Plan (AEIP) work had potential to improve pre-cooling by 3°C to 5°C, giving a saving potential of \$870 to \$1,450 for 2ML of annual production every year! This is calculated using an energy cost of \$0.25/kWh.

The solution for getting better performance is often a new pump for the cooling water, which costs around \$1,000 or cleaning the plate heat exchanger. This takes around three to four hours.

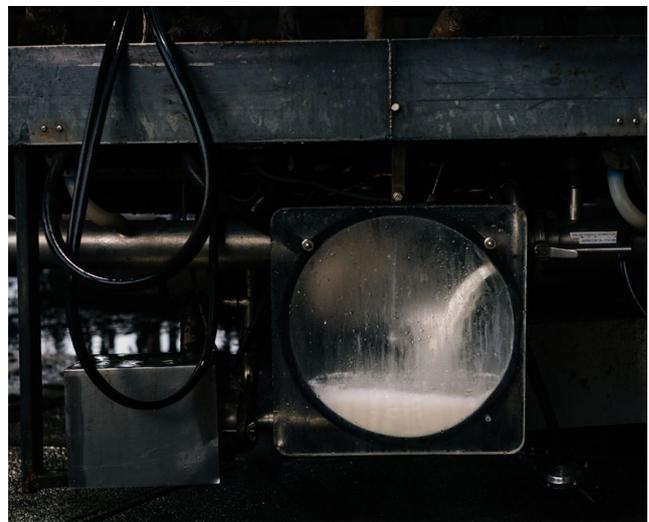
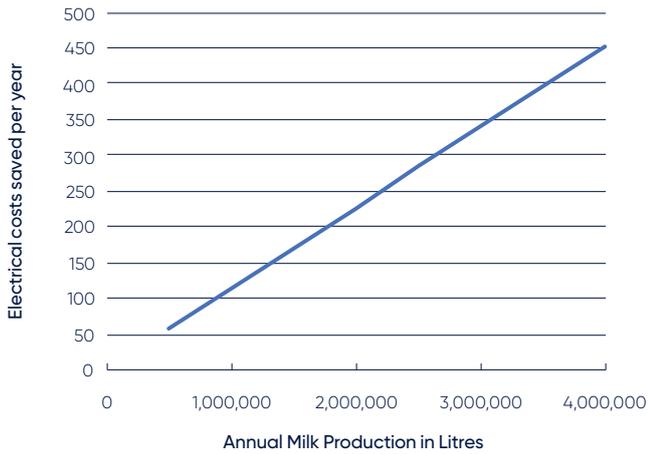


Figure A Electrical cost savings per 1°C of extra pre-cooling.



Assumptions:

- Chiller system co-efficient of performance (COP) of 2.5.
- Electrical cost of \$0.25/kWh.

For some quick tips on improving the pre-cooler performance see the **dairy shed easy energy tune-up diagram**. Checking the performance of the pre-cooler is further explained in the **'Saving energy on dairy farms'** booklet. This booklet gives a method for review of milk cooling and various case studies but lacking ROI and easy to follow action.

To further ensure good pre-cooler performance, optimise the refrigeration system performance by:

- ensuring good maintenance is done for example cleaning the condenser coils
- investing in a professional service (that includes ensuring there is a full charge of refrigerant, etc.)
- ensuring the condenser coils are in a fully ventilated area (i.e., outdoors) and typically on the southern side of a building to be in the shade (but this is not essential)
- upgrading the system to utilise an electronic expansion valve
- replacing the system if it is more than 20 years old – a new system should perform 10 to 20 per cent more efficiently.