Dairy energy savings checklist

1. Introduction

Saving energy need not cost you a fortune. This Quick Note brings together some simple things you can check to ensure your dairy is using energy efficiently – without costing a cent!

2. Interpretation and relevance to Australian conditions

The main areas of energy use in the dairy are: water heating (41%), milk cooling (30%), operating the milking equipment (19%) and miscellaneous uses such as lighting (10%). Although technical specialists are required to service much of the equipment, there are many relatively simple checks that can made to improve the efficiency of the various dairy processes.

3. Relationship to CowTime goals

Operating an energy efficient milk harvesting system can significantly reduce total and peak energy demand and so reduce shed operating costs. This will reduce the cost of milk harvesting.

4. The checklist

The first step is to check your pricing and tariff structure with your electricity retailer. Most dairies should be on (farm) tariff 'D'. Once satisfied that you are paying a reasonable price, it is time to go to work with this checklist to reduce your energy consumption. Your aim is to tick off as many of these checklist questions as possible - and act on any areas you have identified as needing attention.

Plant cleaning

	Hot water systems	Yes	No
Set-up			
1.	Check to make sure the off-peak time clock meters are set correctly (11.00pm to 7.00am EST) at the power box. Note – the newer digital meters do this automatically.		
2.	Is the hot water service(s) protected from drafts (and weather) and kept dry? (ie out of the way of wash down water)		
3.	Does the capacity of the hot water service match the daily requirement for milking (without using the daytime booster)?		
4.	Are the sacrificial anodes in the hot water service(s) checked regularly?		
5.	Is the hot water unit free of hot spots?		
6.	Is the hot water unit flushed regularly to remove sludge or mineral build up?		
7.	Are the metal pipe connections into the hot water service well insulated?		
Operation			
8.	Have you reviewed your washing regime with your chemical reseller recently to look for opportunities to reduce costs? (ie reduce hot water volume / temperature).		
9.	Does the hot water service deliver hot water into the CIP barrel at a temperature between 75 and 85^{o}C? Check this by comparing the morning hot wash temperature with the thermostat setting (if possible) & adjust.		
10.	Do you always commence morning wash-up after 7 am? (If cold water enters the hot water unit before 7 am it will be heated unnecessarily.)		
11.	Have you eliminated hot water leaks and wastage?		
12.	Do you conserve heat by only filling the CIP barrel immediately prior to the wash cycle beginning?		
13.	Does the hot water service boil secretly at night? (check overflow pipes for signs of overnight discharge)		

Milk cooling

	Pre-cooling	**Yes**	**No**
Set-up			
14.	Has the plate cooler been correctly sized for the job?		
15.	Are you using the coldest available source of water / cooling fluid all year round? (Bore water or the bottom of a dam are often the coldest)		
16.	Do you have an even flow of milk through the pate cooler? (the activity of the milk pump should give you some clues)		
Operation			
17.	Do the cooling fluid and milk flow in opposite directions through the plate cooler?		
18.	Is the temperature of the milk leaving within 2 to 3°C of the source water / cooling fluid entering the plate cooler?		
19.	Does the water flow rate exceed the maximum milk flow rate by at least 3 : 1 for 'm' -type plate exchangers (or 2:1 for industrial-type)?		
Refrigeration plant			
Set-up			
20.	Is the refrigeration unit protected from rain and direct sunlight?		
21.	Is the condenser located to take advantage of prevailing winds / allow unrestricted airflow around the unit?		
22.	Is the vacuum pump exhaust positioned far enough away to prevent oil build-up on the condenser fins?		
23.	Are the condenser cooling fins clean and undamaged?		
24.	Is the compressor and refrigeration motor clean and free of oil leaks?		
Operation			
25.	Does a qualified refrigeration mechanic undertake maintenance annually?		
26.	Does a thermostat control the compressor motor so it automatically turns off when the vat reaches 4°C?		

Other dairy equipment

	Milking Plant	**Yes**	**No**
27.	Are annual tests carried out by a Milking Machine technician to check vacuum regulation, airflow/leaks, drive belts, etc?		
28.	Is the vacuum pump motor clean and well ventilated?		
Miscellaneous			
29.	Do you clean your light tubes and fittings annually?		
30.	Have you replaced incandescent lights with energy efficient fluorescent bulbs and/or metal halide lights? Triphospher fluorescent bulbs are even better then standard fluoro tubes.		

Other considerations

	Purchasing new equipment	**Yes**	**No**
	When replacing a piece of equipment (pump, motor etc) do you choose the most energy efficient option? (Try and plan this before a breakdown).		
	Have you assessed the option of soft start technology on your larger motors?		
	Have you assessed the option of reclaiming heat from your refrigeration system to pre-heat water for your hot water service?		
	Have you assessed the option of using solar hot water units to pre-heat water for your hot water service?		
	Have you assessed the option of a variable speed drive on your vacuum pump and/or your milk pump?		
	Have you assessed if other fuel sources are more cost-effective than electricity for heating water? (eg natural gas or LPG for boosting hot water during the day)		

5. Potential issues with implementation

These checks are designed to identify energy waste and can be done in a few minutes and repeated on a regular basis. Always be mindful of safety. Implementing changes may require the skills of a registered electrician, refrigeration mechanic or a qualified milking machine technician.

Many of us do not like to do simple routine checks but the benefits can be worth the effort.

6. Robustness of this information

This checklist is not designed to be a comprehensive list of every option available to farmers, rather it highlights simple checks that farmers can make to identify areas of significant energy wastage in their dairy operations. Many of these checks will help your existing plant to work to its optimum. This helps you get the best from your facilities.

7. References and further reading

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Genesis Automation. Steps to reducing energy costs on your dairy farm. www.genesisauto.com.au/html/dairy.htm