



Using heat recovery units for water heating

The basics

Every day dairy farmers are faced with hot milk that needs cooling and cold water that needs to be heated. Water heating accounts for around one third of energy use on a dairy farm and is mainly carried out using electric immersion heaters. Heat Recovery Units (HRU) are all about recovering the heat from the milk and using it to pre-heat water needed for plant washing. In some cases, using this technique can halve water heating costs. Milk cooling performance is also improved.

In practice

There are two main ways to recover heat from the milk refrigeration system:

- Water storage heat recovery
- Continuous flow heat recovery.

Water storage heat recovery

Hot gases from the refrigeration system are routed through coils/heat exchangers that heat a static volume of stored water.

The HRU effectively becomes a hot water header tank connected to the conventional water heater.



CASE STUDY



Rather than using a heat recovery tank, Keith Pugh of Gwndwn Farm, Plwmp, Llandysul uses small heat exchangers in a continuous flow system to preheat water for the water heaters.

The photograph below shows the water and refrigeration flow pipework and the small heat exchangers. It's a system which is easy to retrofit and it takes up very little space.

Keith said: "The system is very simple, works well and I am pleased with the amount of hot water that it generates.

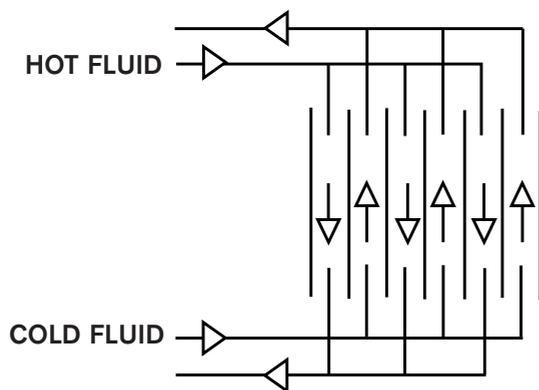
"The water heater only needs to increase the water temperature from 55°C to the desired temperature instead of from the usual 10°C – saving a lot of energy and money."



Continuous flow heat recovery

Hot refrigeration gases are passed through a plate heat exchanger (PHE) in one direction, with the water to be passed through and heated in the opposite direction. The heated water can either be recirculated through the heat exchanger to build up water temperature or put through as a single pass and stored until needed.

There are usually practical considerations which will possibly make one of the techniques more suitable. The former is simple to engineer but maybe comparatively expensive. The latter is cheaper to install but needs careful tuning to get the optimum results.



The hot and cold fluids (gases or liquids) flow through different circuits in opposite directions through the PHE

As refrigeration gases are not hot enough to heat the water to full circulation cleaning temperature, the water temperature has to be topped up with an immersion heater. Usually the heat recovery system can achieve temperatures of around 60°C if working well.

A positive spin-off from using this technique is that it can improve the performance of the milk cooling

system, especially in the summer time. Refrigeration systems work more efficiently if the hot gases which go through the condenser coil are cooled more quickly. Heat recovery supplements the work of the condenser and therefore helps to achieve this.

Potential savings

Heat recovery saves on average approximately 60% of water heating costs. For a parlour heating 200 litres per day to a temperature of 85°C, heat recovery will save the business around £260 per annum (compared with Economy 7 night rate electricity).

The following potential cash savings (%) are available when compared with using day-time electricity to heat your water. These figures do not take into account capital expenditure.

Technique	Saving
Economy 7 (night rate tariff)	50%
Heat Recovery Unit	60%

For more information on using heat recovery units for water heating please contact:

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