

# Energy Efficiency in Dairy Sheds

## Case Study: Milk Vat Insulation at Coldstream Downs



June 2007

www.cowshed.org.nz

The Coldstream Downs Ltd farm is located in the Waimea Valley about 10km south of Balfour. The dairy shed is about 6 years old and is fitted with a 60 bale rotary milking platform.

There are two milk storage vats – one of 16,000 litres and the other 14,000 litres capacity. For much of the season bar 11 weeks of peak production, this is sufficient capacity to hold two days production and so from early December onwards, the milk tanker only calls every second day.

### Milk vat insulation

Most milk vats are insulated only on the base where the cooling pad is fitted. Adding insulation to the side walls reduces the transfer of heat into the milk, especially on days that are sunny, warm and windy. This reduces the load on the refrigeration system and helps to ensure that the milk is chilled down to 6°C as quickly as possible. By shortening the refrigeration running time, insulation also reduces the amount of electricity used by the refrigeration unit.

### Trial at Coldstream Downs

The west vat at Coldstream Downs was fitted with an insulating wrap supplied by Dairy Technology Services (DTS) and marketed under the name Polar Wrap. The wrap consists of a 10mm thickness of closed cell plastic foam faced with a layer of aluminium foil. The outer layer is a reinforced PVC covering coloured white and this provides good protection for the more delicate



insulating layer beneath. It is also washable.

The Polar Wrap is custom made to suit the vat dimensions and is attached by strapping. It can be easily removed if necessary.

Milk temperature in the vat and electricity use by the refrigeration unit were monitored and recorded and a weather station provided data on air temperature, solar radiation and wind speed and direction.

### Results

The Polar Wrap was fitted in mid-December 2006 at a cost of \$2,800. Measurements and calculations made before the wrap was fitted showed that under the worst conditions, the heat gain through the vat walls was 6kW.

After the wrap was fitted it was found that in comparable weather conditions, heat gains were reduced by 80%. Calculations show that over a full year at Coldstream, the vat wrap is expected to reduce the energy gain by 4,200 kWh. Because this energy is removed by a refrigeration unit, the electricity saving will be about 50% of that or 2,100 kWh. At the marginal electricity cost of 14 c/kWh, this saving is worth \$300 per year.

A more important advantage of insulating any milk vat may be the ability to maintain normal chilling times during periods of hot weather.

