Australian Government
Department of Industry and Science

Dairy Australia
Your Levy at Work

Smarter energy use on Australian dairy farms

# Independent analysis of national energy assessment data

Since 2012 almost 1,400 dairy shed energy assessments have been conducted in all dairy regions across Australia as part of the national Dairy Australia project *Smarter energy use on Australian dairy farms*, funded by the Department of Industry and Science as part of the Energy Efficiency Information Grants Program.

As part of this project, RM Consulting Group was commissioned to undertake an independent analysis of the energy assessment data that was collected during the 1,400 dairy shed assessments. This fact sheet summarises the outcomes from that independent analysis at the national level.

## Background

The *Smarter energy use* program will close in June 2015. Since 2012 this project has successfully delivered 1,400 energy assessments, covering ~21% of dairy farms across Australia.

This information sheet is benchmarking data from those assessments. The energy assessments involved: review of 12 months of power bills; shed visit for energy efficiency assessment and follow up visit/communication with farmers with recommendations.

This data only relates to dairy shed use and any other loads connected to the dairy metering point. So it does not include irrigation, which is typically the biggest part of the power bill for irrigated farms, depending on the season.

The data excludes automatic, small rotary (herds <150) and large walk through (herds >300) dairies which all have higher energy use compared to others with a similar herd size.

## Key findings of study

### Energy costs per 100 cows

Energy costs per 100 cows can provide a simple benchmark. These benchmarks can indicate if you have a problem and therefore are a good indicator of potential savings. If your energy use were similar to the 'high' benchmark it would be worthwhile undertaking an assessment of your energy use to identify where efficiencies can be made (Table 1).

**Table 1** National benchmarks

| | National benchmarks | | |
|---|---|---|---|
| | Low | Average | High |
| Total energy costs per 100 cows | $4,000 | $6,600 | $9,200 |
| Hot water costs per 100 cows | $560 | $1,590 | $2,610 |
| Milk cooling costs per 100 cows | $1,170 | $2,290 | $3,400 |
| Milk harvesting costs per 100 cows | $690 | $1,280 | $1,860 |
| Energy use per milk production kWhr per 1000L | 31 | 48 | 66 |
| Energy cost per milk production $ per 1000L | $6 | $11 | $15 |
| Energy cost per kWhr (average for year of assessments from 2012 to 2015) | $0.18 | $0.22 | $0.26 |

All figures are inclusive of GST

### Energy use and cost per kL milk

For benchmarking energy use, the best comparison is kWhr per kL because that accounts for variations in L per cow and MS per cow. The amount of energy used largely depends on the volume of milk physically harvested and cooled. See Table 1 for benchmarks per kL milk.

### Scale is important

Dairies with larger herd sizes have lower energy use per kL milk. Energy use for all three main cost components is lower for larger herds.

Energy use per kL milk declines by about 14% from herd size 100 to 200 and then by about 4% for every 100 cows up to 500 cows.

### Identified savings

Typically, more than half (55%) of the assessments identified savings of less than $2,000 per year. About 40% of properties had potential to save a modest amount ($2,000–$10,000). Substantial savings (up to $29,000) were identified for a small (5%) proportion of the assessments.

## Energy use

There was a herd size impact i.e. dairies with larger herd sizes have lower energy use per kL milk (Figure 1).

## Total costs per farm

Annual power bills per business were highly variable and ranged from $1,663 to $121,722. As expected, annual power bills increase with herd size.

## Cost components

Figures 2 and 3 show the breakdown of energy costs for the most common dairy types, rotary and herringbone.

The three main energy cost components are hot water, milk cooling and milk harvesting totalling about 79% of energy costs. To reduce energy consumption and costs, focus on the three main cost components.

Energy use for all three main cost components decline with herd size (Figure 4).

**Figure 1** Energy use per milk production, by herd size kWhr per 1000L

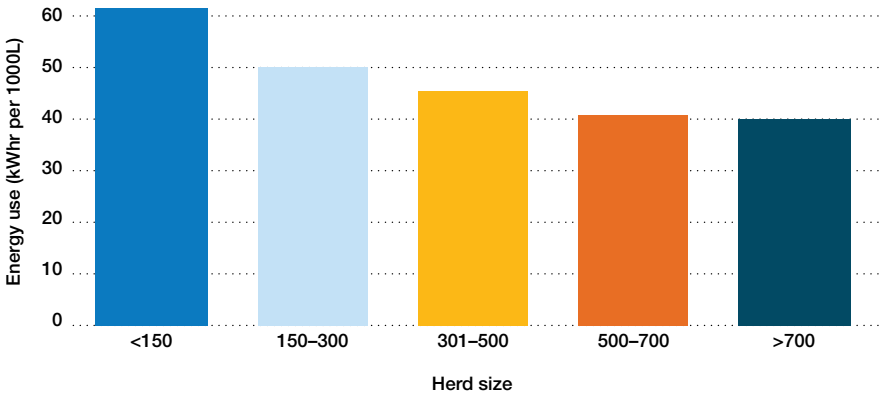
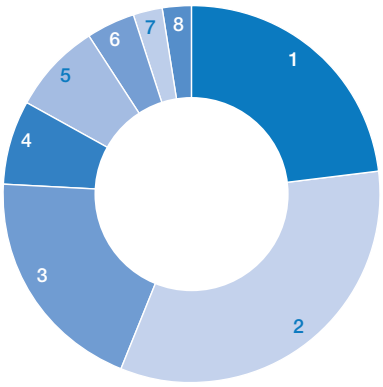



**Table 2** Variability of total energy costs per business ($/year). Excluding automatic, small rotary and large walk through dairies

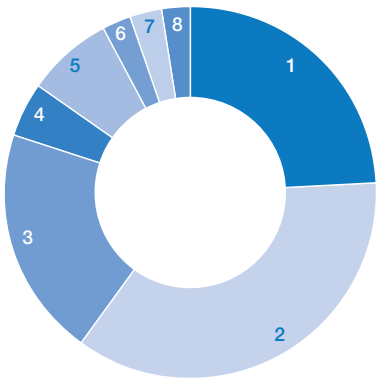
| Herd size | Min | Max | Average (Mean) |
|---|---|---|---|
| <150 | $1,663 | $23,867 | $7,916 |
| 150–300 | $3,586 | $55,778 | $14,753 |
| 301–500 | $3,985 | $63,106 | $23,888 |
| 501–700 | $18,510 | $76,419 | $35,541 |
| >700 | $14,906 | $121,722 | $50,070 |
| **Total** | **$1,663** | **$121,722** | **$19,972** |

**Figure 2** Breakdown of energy costs average for rotary sheds




| | | |
|---|---|---|
| 1 | Hot water | 23.2% |
| 2 | Milk cooling | 33.1% |
| 3 | Milk harvesting | 19.8% |
| 4 | Cleaning and effluent | 7.1% |
| 5 | Stock and dairy water | 7.9% |
| 6 | Feed | 4.1% |
| 7 | Shed, office, workshop, misc. | 2.6% |
| 8 | Lights | 2.3% |

**Figure 3** Breakdown of energy costs average for herringbone sheds




| | | |
|---|---|---|
| 1 | Hot water | 24.4% |
| 2 | Milk cooling | 35.7% |
| 3 | Milk harvesting | 20.0% |
| 4 | Cleaning and effluent | 4.8% |
| 5 | Stock and dairy water | 7.4% |
| 6 | Feed | 2.4% |
| 7 | Shed, office, workshop, misc. | 2.8% |
| 8 | Lights | 2.4% |

## Savings for farmers

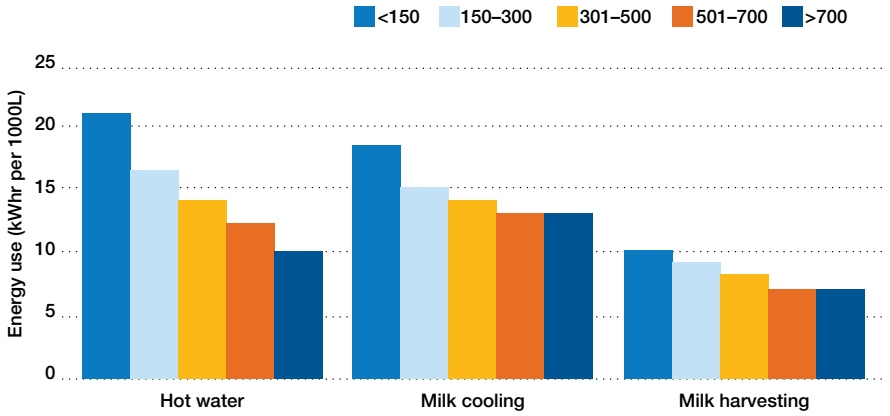
Typically, more than half (55%) of the assessments identified savings of less than $2,000 per year. About 40% of properties had potential to save a modest amount ($2,000–$10,000). Substantial savings (up to $29,000) were identified for a small (5%) proportion of the assessments.

The most commonly identified savings were associated with:

- Improved functioning of equipment for milk cooling, including function of the plate-cooler and the compressors on the vats and using cooler water sources
- Pre-heating hot water for hot water systems, using heat exchange units (where appropriate) and using correct water temperatures
- Installing variable speed drives (VSDs) on vacuum pumps.

In addition to energy savings, for some farms there were further dollar savings to be made with electricity billing arrangements and changeover to time of use contracts. Although these do not reduce energy use, they can substantially reduce total bills.

**Figure 4** Energy use for the three main cost components, by herd size kWhr per 1000L




By considering these opportunities, farmers might be able to reduce energy use, lower the costs (through changes in electricity billing arrangements and/or changeover to time of use contracts), and have fewer greenhouse gas emissions.

The energy use data and legacy resources from this program will be available to the dairy industry well beyond the life of this program. See frds.dairyaustralia.com.au/events/smarter-energy-use/

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