DairyNZ Milksmart

Lighting

The dairy, like any other workplace, needs to have good lighting for safe, efficient operation.

Many older dairies have solid walls and low roofs, requiring the use of artificial lighting even during daylight hours. Milking typically starts before dawn and the evening milking can extend till after dark, so even newer, better designed dairies require artificial light.

Good lighting can make milking easier and more productive. It can improve cow flow and reduce the risk of injuries to cows and workers. Good natural lighting, combined with energy efficient lights, can also reduce operating costs.

Even light distribution is important throughout the dairy but the milking platform and pit need to be especially well lit.

- As a general rule, illumination must be sufficient to allow milkers to assess the cleanliness of cows' teats and the colour and quality of milk strippings. White light makes this task easier.
- Mount lights above the line of sight of the milker.
- The recommended illumination levels in the milking area are given in Table 1.

Area of milking facility	Illumination level in lux	Comparative lighting levels
General lighting	200 – 215	General home lighting
Milking pit	500 – 538	Well lit office

Table 1. Suggested illumination levels for dairies.

Source: National Milk Harvesting Centre, Australia.

Lighting options

When choosing lighting options it is preferable to make use of as much natural lighting as possible. Higher roofs and open sides make a big difference to the amount of natural light in the milking area.

Fluorescent light fittings are particularly suited to dairy sheds. The fittings are cheap and the triphosphor tubes commonly used in the modern fittings are very energy efficient. They also have good colour rendering characteristics and instant restart.

In dairy sheds still using incandescent lights, compact fluorescent lamps can also be used as a direct replacement for the existing lamps. Compact fluorescent lamps are now available in high wattages and substituting a 45 watt lamp for a 200 watt incandescent lamp will cut energy use by almost 80% while still providing the same light output.

Types	Energy Efficiency	Lighting Options (listed from least to most energy efficient)
Incandescent (traditional light bulbs)		Best used in areas where lighting is only required for brief periods. These lights are cheap, easy to replace and instantaneous. However, they are energy inefficient and the lamps have a short life span.
Halogen		Designed to provide high intensity light in a specific direction, for example in walkways or to inspect the inside of bulk milk tanks etc. They are inexpensive to purchase but expensive to operate because of low energy efficiency. These are often seen in the dairy yard.
Fluorescent		The most cost-effective general lighting for dairies. A mounting height of less than 3.5 meters (and a large number of tubes) is desirable to give adequate lighting for the pit. Tubes should be cleaned annually (and replaced every 4-5 years) as their output is greatly affected by dust.
Mercury vapour (high pressure)		These lights have high outputs making them suitable for general lighting in larger areas with high roofs. They are fairly inexpensive and the lamps have a long life, but throw a slightly pinky-blue-white light. They take several minutes to reach full brightness after being switched on.
Metal halide		Metal halide lamps have similar uses and operation to mercury vapour lamps but have a shorter life (12,000+ hours) and are 3-4 times more expensive. However, they throw a very white light and are about twice as energy efficient.
High pressure sodium		Extremely energy efficient and have a long life (25,000 hours). They are used extensively in very cold climates. Best suited to outdoor flood lighting.

Table 2. Features of different lighting options including energy efficiency.

Figure 1. Polycarbonate walls and ceiling panels let in natural light.

Colour/uniformity of light

When trying to check teat condition, or milk for blood or clots in the pit it is helpful to have light that shows the true colour of different objects. Incandescent lamps show the true colours of objects the best of all common lighting sources. However, high-quality fluorescent or metal halide lamps (with a colour rendition index of 80 or more) are a good compromise and are adequate for most dairies.

The uniformity of light is affected by the height and spacing of the lights. A high level of uniformity is required in an intense work area such as a milking pit, office and milk room washing area. This level can be achieved by using a fixture spacing to mounting height ratio of 1:1 e.g. mount the lights 3 metres apart if they are mounted 3 metres above the ground.

Suggested improvements

Actions to take

- Cows do not like to walk into very bright light. Take this into account when situating lights.
- Try to use the most efficient lighting options: fluorescent, high-pressure sodium or metal halide.
- Use a matte finish for reflective surfaces to reduce glare for both cows and milkers.
- Install motion detector lights and automatic timers in passageways.
- Think about the colour of the light when selecting artificial lighting. When trying to identify stripped milk for blood or other indications of health problems, it is useful to have as white a light as possible.

Projects to consider

- Use as much natural light as possible through adding in skylights and clear walls - both let in more natural light. Use materials like polycarbonates (see Figure 1). Clear sky-lights can let in too much heat if the roof is low and orientated towards the sun.

1.1 Further reading

- For information about water heating, milking systems, milk chilling and efficient lighting. Genesis Dairy Energy Savings. http://www.dairysavings.co.nz/default.aspx
- Reduce, Re-use, Recycle – Dairy Industry InfoSheet B1. Dairy Industry of South Australia. January 2008. http://www.dairyindustrysa.com.au/__data/assets/pdf_file/0020/60932/RRR_InfoSheet_-_Dairy_Lighting.pdf

Action points

- ✓ When installing lighting consider positioning for maximum efficiency and to encourage cow flow.
- ✓ When selecting artificial lighting, select lighting which is energy efficient and think about the colour of the light.
- ✓ Consider methods of utilising natural light.
- ✓ Ensure you have uniform lighting in intense working areas by using a fixture spacing to mounting height ratio of 1:1 e.g. mount the lights 3 metres apart if they are mounted 3 metres above the ground.