Lighting considerations for farms

On the surface, lighting specifications for buildings may seem simple, but in reality it is easy to end up with a sub-optimal lighting system that doesn't deliver what was required. There are many factors that should be taken into consideration when designing a lighting system. A bespoke computer programme can be used to aid the selection process for the best lighting system. Such a programme can factor in aspects such as reflectivity of surfaces, which in turn alters how much light is required. The following questions, while not exhaustive, should be considered when considering the best system/lighting type to install in any particular area.

What level/intensity of light is required? Light intensity is measured in lux. The milking parlour should have a minimum of 500 lux without shadows, whereas for a collecting yard, 50 lux is adequate, with up to 200 lux recommended for cubicle sheds.

How many hours per year will the light(s) be operational? For lights used infrequently, lower cost, lower efficiency units will be optimal. For lights with high usage, then the energy efficiency of the unit is an important consideration, plus the number of units required and cost per unit.

Is the colour of the light generated important? In other words, how easy is it to see the true colour of different objects when illuminated by the installed light? For the milking parlour this is an important consideration, as the operator will want to be able to see clearly any colour changes in milk and possible clots from fore milking. Hence fluorescent tubes will often be the system of choice. (Note however that modern fluorescent tubes may interfere with parlour auto ID systems). In the cubicle house, the colour of light generated is less important, as the need to see fine detail is less of an issue, so high pressure sodium lights are more likely to be the best choice.

How uniform should the light be? In other words, how important is even distribution of light across the area of work? This will determine the type/number of units that need to be installed. Some types of lighting system are quite directional, (like a torch), e.g. many LED systems, while other give a much wider spread, (fluorescent tubes). For the milking parlour, good distribution of light is important across the whole area, whereas it is less important in the collecting yard, or outside areas.

What distance is the light fitting from the area to be illuminated? This will influence both the number of units that need to be installed and also the most appropriate type of lighting system. Any requirement for uniformity of light will also influence the lighting choice in this regard. High pressure sodium units located near the roof are ideal for cubicle sheds as they give a good spread of light over a large area and are also very efficient. LED's may also be a possibility as their cost is reducing.

How will lights be controlled? There are several methods to control when and how lights are be switched on and off, (motion sensors, photocells, timers). The best combination of controls can greatly add to convenience and also reduce unnecessary electricity consumption.

Where should switches be located? They should be near the main entrance, with consideration given to 2 way switches, if more than one entrance/exit is used on a regular basis. Thought should be given to the number of lights per switch, so that areas are not lit unnecessarily.

What about natural light? Natural light should be used where practically possible. Approximately 10-15% of a roof as skylights will give adequate natural lighting, (100 – 500 lux). More skylights than this can increase temperatures during warm summer days, resulting in possible heat stress for housed animals.

What are the expected whole of life costs? Initial installation costs, electricity consumption cost, any bulb replacement costs and expected lifespan of units all need to be considered. Generally, few numbers of larger lights cost less to install, but uniformity of lighting may not be adequate. There is a big variation in the cost of bulbs; from a few pence for traditional light bulbs to maybe £40 for a high pressure sodium bulb. Specialist lifting equipment may needed to access light fittings, so in such cases, long life bulbs are likely to be the best option, whereas for a bulb that can be changed at or near ground level, bulb life is less of an issue.

What about the quality of the fitting? This is particularly important for LED's, as the lowest price product may be lower quality and not last as long as expected. Consider also whether the light fitting is designed for the environment that it will operate in, such as moisture, dust, corrosion.

Will efficiency decrease with time? Some light units decrease output with time, such as LED's. Others with background reflective surfaces that deteriorate over time will appear to give out less light. Dust/dirt on light covers can dramatically reduce the amount of light received.

Are there lighting benefits for milking cows? There is a body of research indicating that when cows are subject to a lighting regime of 160 – 200 lux for 16-18 hours per day, with 6 – 8 hours of darkness, milk yield increases by approximately 2 litres per day, (intakes also increase). This is the lighting system adopted for milking cows at CAFRE Greenmount and while there is no control treatment group, silage intakes and milk yields are considered to be relatively high with this regime. For dry cows, the complete opposite regime has been shown to increase subsequent milk yield, (16 hours darkness and 8 hours light), but is difficult/costly to implement in practice. This was considered for the new dry cow house at CAFRE Greenmount, but was not implemented, as a forced ventilation system would have had to be installed.

General comments: Seek specialist advice. New products with improved energy efficiency are constantly being developed, particularly in relation to LED's, so talk to people in the know. The cheapest product/solution may not be the cheapest in the long term. Install known high quality units that are fit for purpose.