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Proper lighting on farms increases productivity and labor efficiency. Energy efficient lighting represents one of the easiest and lowest cost investments you can make. Many farms still utilize incandescent light bulbs, a lighting technology developed by Edison over 125 years ago. While incandescent lighting still meets lighting needs, it is the least efficient type of lighting technology available today. A 2003 study of New York State dairy farms reported that lighting accounted for an average of 24 percent of the electricity used on dairy farms, approximately equal to the energy consumed to cool milk (25 percent). You can reduce lighting-related electricity use by installing compact fluorescent lamps (CFLs) in place of existing incandescent bulbs. CFLs are a cost effective, energy efficient and economical alternative to traditional incandescent lights.

COMPACT FLUORESCENT LIGHTING

CFLs are designed to be compatible with traditional incandescent light bulb fixtures. Replacing an incandescent light bulb is as simple as unscrewing the existing bulb and replacing it with a new CFL. CFLs are most applicable in low moisture, low dust environments such as utility rooms, office spaces, machine sheds and residences. They can also be used in feed rooms and animal housing if you install fixtures that are approved for use in wet locations. A farmer can expect savings of almost \$60 over the life of a 100-watt equivalent CFL. (see Table 1 on reverse side for chart identifying additional savings of CFL-equivalent lights) Replacing a 100-watt incandescent bulb with an equivalent 25-watt CFL can save a farm \$2 per lamp each month in energy costs, assuming a 100-watt bulb is used for ten hours per day at \$0.085 kWh. (Replacing ten 100-watt bulbs can save \$20 a month.) However, you should consider many factors when selecting the appropriate CFL for your farm needs.



Figure 1 - Compact Fluorescent Lamp Types

LAMP SELECTION

CFLs come in various styles, including spiral, U-tube, flood lamps and decorative. The photo in Fig. 1 shows examples of a spiral, U-tube, floodlight, decorative enclosed spiral and a pin-in tube. Spiral or U-tube CFLs are used for general incandescent bulb replacement. CFL floodlights can be used for both outside or inside area lighting needs, and decorative enclosed CFLs should be used in areas where aesthetics are important. The plug-in base CFLs are designed for use in fixtures with permanent ballasts. There are two types of lamp bases: screw bases can be used to replace an incandescent bulb with a CFL; and pin bases, that use a separate, permanent ballast. You can install special dimmable CFLs in areas where light control is important, such as poultry housing or in a residence.

CFLs come in a variety of light outputs. Most CFLs are rated with incandescent equivalents. Typically, they use only 25 percent of the power that an incandescent bulb would use to supply the same light output (lumens). There is some variation among CFL manufacturers in the light output (lumens) per watt. Focus on Energy recommends that when shopping for CFLs, look for products with similar lumen output to the

incandescent bulb being replaced. This measure is more helpful than comparing the wattage or wattage equivalent. Table 1 provides typical CFL equivalents.

INCANDESCENT BULB (WATTS)	CFL (WATTS)	LIGHT OUTPUT IN LUMENS	ENERGY SAVINGS (LAMPLIFE)
40	13	490-510	\$17
60	15	870-950	\$33
75	20	1190-1300	\$42
100	23-27	1500-1690	\$62
120	26-30	1750-1920	\$67
150	32-40	2050-2600	\$70
200	45	2700	\$94
240	55	3600	\$114
300	68	4200	\$117

Table 1 - CFL/Incandescent Lighting Equivalence

FREQUENTLY ASKED QUESTIONS ABOUT CFLS

WHEN DO I NEED TO USE A WATER-TIGHT FIXTURE?

The Wisconsin electrical code states that water or vapor tight fixtures must be used in any animal housing as well as wet or damp environments such as milk houses and feed rooms. There are two types of vapor-tight fixtures; one accepts a CFL with a screw base such as a "Jelly Jar," and the second has the ballast incorporated into the fixture and accepts a CFL with a pin base. You can find vapor-tight fixtures at an electrical equipment supplier or through product catalogs. You should also consider purchasing fixtures with plastic housings since they will not corrode. Enamel coated die-cast aluminum fixtures are acceptable, provided they are rated for wet locations.

WHAT TYPE OF CFLS SHOULD BE USED IN AN ENCLOSED FIXTURE?

CFL packaging for the lamp will indicate if the bulb is designed for enclosed fixtures. CFLs can overheat if they are not used in the appropriate enclosed fixture. If you do not use the correct enclosed fixture, the CFL will flicker and its lifespan will be reduced. Focus on Energy does not recommend using CFLs larger than 30 watts in an enclosed fixture.

WHERE CAN I PURCHASE CFLS?

CFLs that are equivalent to incandescent bulbs (rated at 100-watts or less) are available at retail outlets that sell residential fixtures and bulbs. Higher wattage CFLs (200-watt



Figure 2 - Water-Tight CFL Fixtures

or under) are available from electrical equipment suppliers and some building supply outlets. High wattage lamps are typically available only through electrical suppliers or direct from a manufacturer.

CAN I USE CFLS OUTSIDE OR IN UNHEATED SPACES?

CFLs have an electronic ballast that allows them to work at low temperatures with no flickering. Most CFLs will work at 32°F. You can also purchase CFLs that operate in temperatures that reach -20°F. However, you should check the lamp package for the actual specifications. In cold temperatures, the CFL will experience a one or two second delay before switching on, and full illumination may take up to two or three minutes until the bulb fully warms up.

HOW DO I DISPOSE OF BURNED-OUT CFLS?

Used CFLs and fluorescent lighting contain a minute amounts of harmful mercury vapors and are considered a hazardous waste. Wisconsin law requires that businesses recycle all mercury based lights, including CFLs, fluorescent tubes, mercury vapor, high pressure sodium and metal halide lamps. To find a lamp recycling location near you, contact your town or county Clean Sweep program or refer to the Wisconsin Department of Natural Resources publication, WA 195-03, *Safe Lamp and Bulb Management*. This publication can be accessed directly from the DNR's website at: <http://dnr.wis.gov/org/aw/wm/publications/hazard/BulbrecyclingWA195-03.pdf>

If you are interested in learning more about CFLs or other energy efficiency opportunities for farms, contact Focus on Energy at 800-762-7077 and ask to speak with an Energy Advisor from the Agriculture and Rural Business Team. Or visit our Web site at www.focusonenergy.com.