



## Assumptions

This worksheet is intended to be used for calculating light levels in barns with rectangular rooms having ceilings under 12' height. The calculations are for fluorescent 4' long lamps in weatherproof fixtures or for incandescent lamps. The design assumes low wall and ceiling reflectance due to dust and dirt build up. This calculation is a simplified version of the Zonal Cavity method for light level calculations.

## Design

Room Dimensions (feet) = **L** \_\_\_\_\_ x **W** \_\_\_\_\_

Area **L x W** (square feet) = \_\_\_\_\_

Light Level, **FC** (foot candles) = \_\_\_\_\_

**CHR** (cavity height ratio) = \_\_\_\_\_

**DF** (light depreciation factor) = \_\_\_\_\_

Mean Lumens per lamp = \_\_\_\_\_

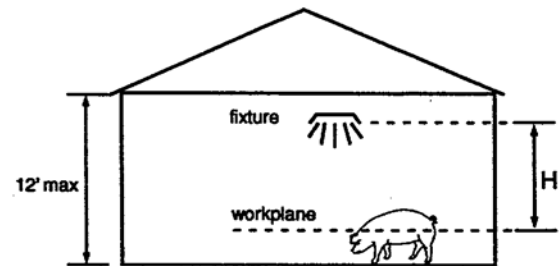
Lamps per fixture = \_\_\_\_\_

Number of fixtures =  $\frac{\text{Area} \times \text{FC} \times \text{CHR}}{\text{DF} \times \text{Mean Lumens/lamp} \times \text{Lamps/fixture}}$

=  $\frac{\text{_____} \times \text{_____} \times \text{_____}}{\text{_____} \times \text{_____}} = \text{_____ fixtures}$

Fixture spacing =  $\sqrt{\frac{\text{Room area}}{\text{Number of fixtures}}}$  = \_\_\_\_\_ ft.

Electrical load =  $\frac{\text{Fixtures} \times \text{Lamps/fixture} \times \text{Watts/lamp}}{1000}$  = \_\_\_\_\_ kW



H	CHR	DF	
6'	1.0	.35	- dirty (white walls)
8'	1.25	.30	- very dirty
10'	1.5		

Incandescent	Mean Lumens	
	(130V, long life)	(120V, std)
60 W	630	855
100W	1265	1650
150W	2280	2780

4' Fluorescent	Mean Lumens
F40T12/./RS	2715
(40 W, warm or cool white)	
F40T12/./RS/ES	2392
(40W, energy saving)	
F32T8/././	2800
(32W, electronic ballast)	



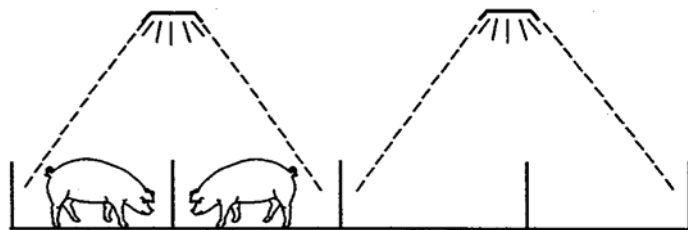
## Light Levels and Photoperiod for Swine Housing

Housing type	Light Levels, FC (foot candles)	Photo period (hours/day)
Breeding	10 to 15 FC	14 to 16
Gestation	5FC, min.	14 to 16
Farrowing	10 to 15 FC	8
Nursery	5 to 10 FC	8
Grower/Finisher	5 FC	8
Farm Office	100 FC	
Shop	50 FC	
Exterior/security	0.5 FC	
Exterior/pathways	5FC	

## Illuminating Engineering Society (IES) Lighting Handbook

Visual task	FC	
Occasional	15	general lighting
High contrast/large size	30	general lighting
Medium contrast/small size	75	task lighting
Low contrast/small size	150	task lighting

Lights located over pen dividers  
to avoid shadows



### Color Temperature of Common Lights

Sunlight at noon	5000°K	bluish
Fluorescent, cool white	4300°K	bluish
Fluorescent, warm white	3000°K	
Incandescent	2900°K	yellowish

### Units

Lumens	= quantity of light emitted by a lamp
1 Lux	=1 Lumen per square metre
Foot candle	=1 Lumen per square foot
1 foot candle (FC)	=10.76 Lux
Mean Lumens	= Light output at 40% of lamp life

Source: Ontario Hydro Agricultural Lighting Program

### Lamp Life and Efficiencies

	Lamp life (50% survival)	Lumens/Watt
Regular incandescent	1,000 hr	16.5
Long life incandescent	5,000 hr	12.4
40W, T12 fluorescent	20,000 hr	51.2
32W, T8 fluorescent	24,000 hr	70.2

### Flourescent Lamp Numbers (4')

F40T12/CW/..  
 F40 - 40 Watt Fluorescent  
 T12 -12/8" diameter tubular bulb  
 CW - cool white (WW is warm white)