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## Daylighting Calculator Spreadsheet Instructions

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Input cells

Calculations - No inputs allowed

### **Farm Info – Inputs page:**

Farm Contact Information: Lines B3 to B11 & D9, D10.

Auditor Name: Select from popup Window – G12

Electric Utility Name: B13 – Select from popup Window, if not in list enter on line B14

Animal Housing Type: A18 - Select from popup Window – reference only

Barn dimensions: A19 to A21 – Enter dimension – used for reference only– if multiple barns do not use.

Parlor type: A22 - Select from popup Window – reference only

Number of milking cows: A23 - Skip – calculates from Lamp – Electrical Usage page.

Milk Shipped per day: A24 - Use yearly average in units of pounds.

Electrical cost: A25 - \$ per kilowatt-hour.

### **Daylighting Assumptions:**

Projected increase in milk production per day per cow: A28 – Research studies have ranged from 1.1 to 7.3 lbs/cow/day increase in milk production. Studies done in the Michigan, Quebec, Ontario and Oregon have an average increase of 4.5 lbs/cow/day with a range of 3.1 to 6.2 lbs/cow/day.

Average annual mailbox milk price: A29 - \$/hundred weight (cwt) or Loan rate milk price.

Increase in feed intake: % increase in feed - As cows produce more milk, more feed is needed.

Daily Feed Costs: This can be entered in two ways; if the dairyman knows his feed cost on a per cow per day basis, it can be entered on line A31. Many farmers do not know their feed cost but likely know the pound dry matter (DM) being fed per cow, which can be entered on line A33. Then select the cost per pound of dry matter. Large farms will likely be \$0.07 per pound DM while small farms (30 cows) would likely be in the \$0.08 to \$0.09 range unless they are purchasing all feed or hiring out their crop work in which case their costs would likely be under \$0.08 because of the higher efficiency of most custom cropping operators. Enter the value in line A34.

Financial Information:

Length of the Capital Recovery period, Loan Length or Expected Life –The length of time in years that you want to amortize the capital cost over.

% Annual interest rate – The interest rate to use for determining the Annualized Capital cost.

### **Summary:**

Projections based on the assumption entered and the lamp data entered on the Lamp-Electrical Usage page.

### **Sensitivity Analysis:**

A sensitivity analysis is provided to help understand the effect of not achieving the assumptions and how wrong your projection can be and still get a reasonable return on investment. The orange highlighted box indicates the income after expenses base on the assumption. The values on lines A63 to A67 can be adjusted to meet the dairyman's desired range for the analysis.

### **Lamp / Electrical Usage page:**

On this sheet, data about the current lighting and the proposed replacement lighting required to accomplish daylighting is entered along with information about the number of cows in different barns or groups (if one wants to break it into groups). The left side is for the existing lighting and the right side is for the new or replacement lighting.

- 1) Enter the name or location of the barn or group of cows in column A.
- 2) Enter the number of milking cows in the barn / group in column B.
- 3) The desired light level can be entered in column C (optional for reference only).
- 4) Choose the type of existing lighting from the popup menu in column D. If you can't find the exact type, choose one with a wattage value close to the existing fixture and place a comment below the chart. If there are multiple types of fixtures in a barn, you will need to use a line for each type but only enter the cow numbers on the first line.
- 5) Enter the number of fixtures in Column E.
- 6) Column F will display the typical wattage for the type of fixture/lamp chosen in column D.
- 7) Enter the number of days per year the lights are be used – typically 365.
- 8) Enter the daily average usage for the lights in hours.
- 9) Columns I & J will calculate the kilowatt-hours of electricity that is being used and the cost.
- 10) Choose the type of replacement lighting from the popup menu in column D. If the current lighting fixtures will be used, it is necessary to choose it again. If you will be using the existing light fixtures and adding additional fixtures, it will be necessary to enter the existing lighting information on one line and then enter the new / additional light fixtures on a second line with no lighting listed on the "Current lighting" side of the page.
- 11) Enter the number of light fixtures to be installed or are existing.
- 12) Enter the number of days per year the lights are be used.
- 13) Enter the number average hours per day the lights will be lit for daylighting. The cows will require 16 to 18 hours per day but for example, if the cows are out on pasture during the day in the summer, this would reduce the daily average.
- 14) Column O will indicate the wattage used by the fixture / lamp chosen in column K.
- 15) Column P and Q will calculate the kilowatt-hours of electricity that would be required for daylighting.
- 16) Enter the per fixture cost of new fixtures in column R and the per fixture installation or relocation cost in column S.
- 17) Column T will calculate the total cost of the fixture and installation.
- 18) Column U will calculate the payback on investment (column T) for the information in a single line. This value is not valid if multiple lines are required to enter the lighting information for one group or barn.
- 19) Column V is a calculation of the increase in milk production, Column B (# of cows) x project increase in milk production entered on the inputs page.
- 20) Column W is the value of the increased milk production, column V x milk price entered on inputs page.
- 21) Column X is the increased daily feed cost based on the feed cost and percent increased feed consumption in the assumptions entered on the input page.
- 22) Column Y is the increase in electrical costs based on the lamp data entered.
- 23) Column Z is the income after the increased feed and energy costs are subtracted from the increase in milk sales.

Any controls, clocks or other accessories can be entered on the page by entering the description in column A or using the pop up menu in column K, entering the number of units in column L and the costs in the appropriate column R or S. The total costs will be calculated in column T and be included in the summary cost.

Contact Scott Sanford, Distinguished Outreach Specialist @ 608-262-5062 or [sasanford@wisc.edu](mailto:sasanford@wisc.edu) if you have any questions or comments.

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