Creep Lamp Control : Case Study

Location	US Midwest
Type	2550 sow breeding unit with 18 farrowing rooms of 24 crates
Creep heating	Open creep suspended lamps rated 125W
Total number of lamps	432
Maximum creep heating load	54kW
Results for year	1999
Mean annual ambient temperature	53ºF
Average heating level used	65%
Creep heating used	307,476 kWh
Creep heating/pig produced	5.48 kWh
Comparable	8.07 kWh
Saving v comparable /pig	2.59 kWh
Total energy saving	145,404 kWh
Estimated cost saving per pig produced @$0.07	18c
Estimated cost saving total	$10,178

Due to the use of open creeps, energy savings are not so great as are readily achievable with enclosed creeps which permits much better targeting of energy use.
Nevertheless, significant energy reductions are achievable through use of Dicam controls.

Two main factors influence creep heating requirement :
- age of litter
- ambient temperature

The first of the following charts shows heating used over a period of 3 months in one room - this clearly shows the cyclic nature of usage over successive farrowing batches.

Since there are 18 rooms on the site, farrowing batches in individual rooms overlap, so that cyclic demand due to age of litter cancels out, leaving the other main factor, ambient temperature.

The second chart shows the load profile throughout the calendar year 1999, with external ambient temperatures for reference. The third chart shows correlation between creep heating demand and ambient temperature, with a regression indicated.

The regression line indicates an average reduction in creep heating of 0.47% per ºF ambient daily temperature above -20ºF.
Since the mean annual temperature (1999) measured at this location was 53ºF, this should require 66.1% mean annual heating level. The mean use actually measured was 65.6% - within 1% agreement.

(Actual use measured by logging level readings of 18 individual circuits at 15 minute interval through the year - a total of 630,000 individual readings).

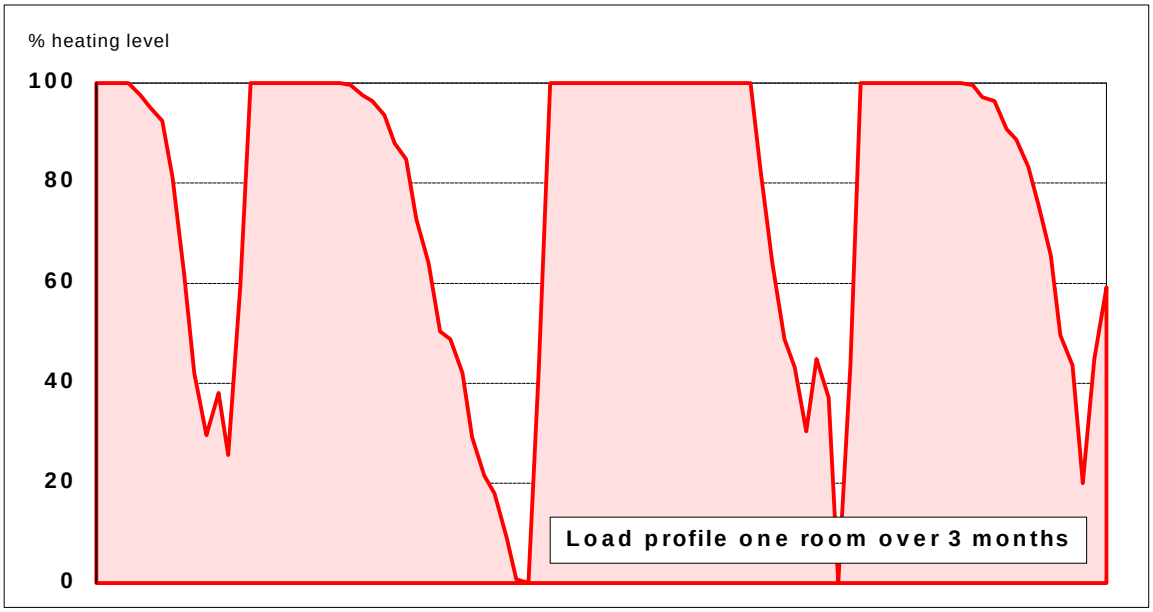
Comparable figures (from a similar site, but not using lamp control effectively) indicate a creep lamp energy use of 8.07 kWh per pig produced, compared to 5.48 on this site.

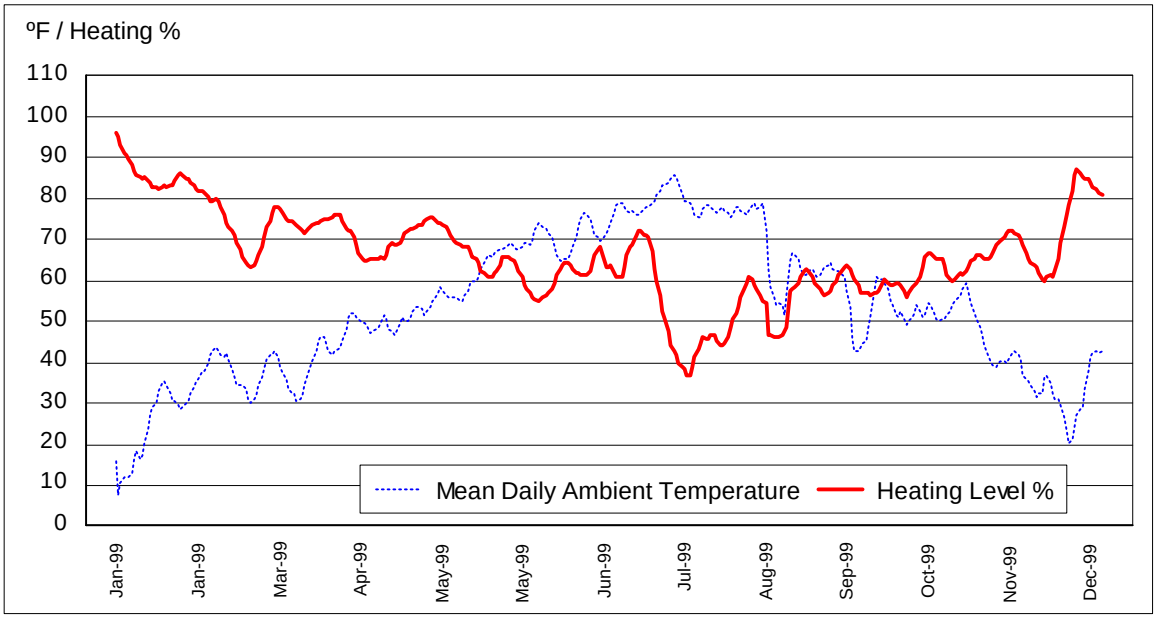
In the year 2000, mean annual ambient temperature was 51.6ºF, predicting an annual average heating demand of 66.8% on the site shown here.

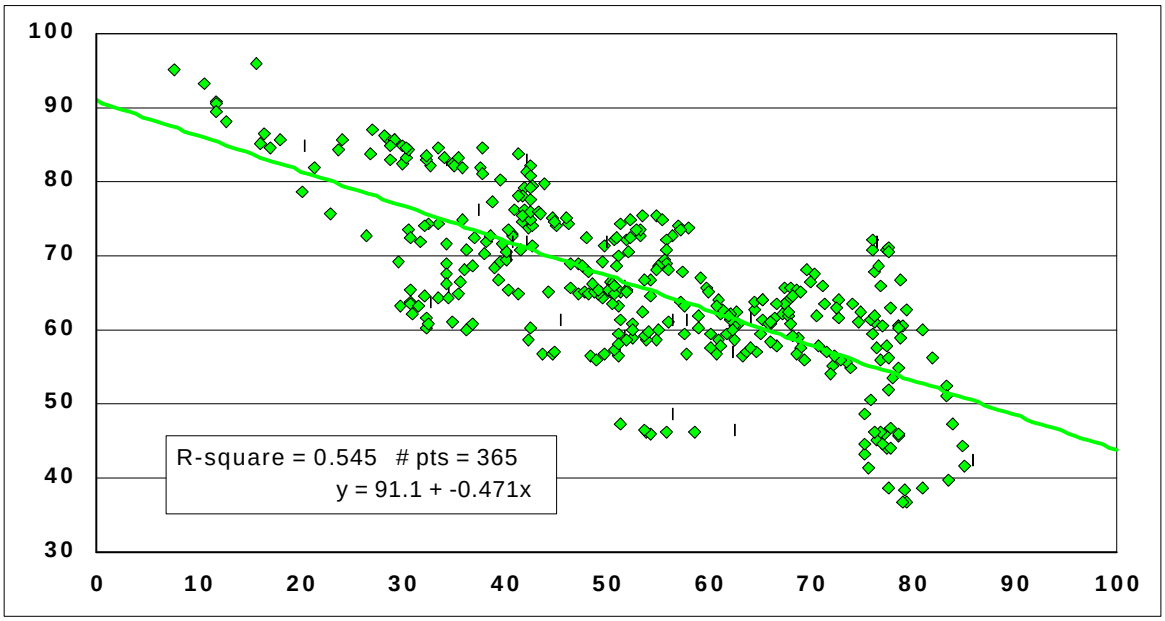
On this site, the annual energy saving would be around 147,000 kWh in 1999 - a saving of about 1/3rd - or 18c per pig, assuming a mean cost of $0.07 per unit. On this site, that amounts to over $10,000 per year.

In practice, costs savings may be more as the ambient temperature dependent reductions are greater during the day, depending on the tariff structure of the energy supplier. Furthermore, using higher than necessary creep energy levels during higher daytime temperatures would mean that extra electrical energy is used in removing the heat by fan ventilation, also at day time tariff rates.

Turning the argument around, the results on this site indicate that comparable producers - that is, with a similar basic situation, but either not having or perhaps not using effective creep lamp control - are using 50% more electrical energy than is needed to produce the required conditions.


% heating level
100
80
60
40
20
0
Load profile one room over 3 months


ºF / Heating %
110
100
90
80
70
60
50
40
30
20
10
0
Mean Daily Ambient Temperature
Heating Level %
Jan-99
Jan-99
Mar-99
Apr-99
May-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99


100
90
80
70
60
50
40
30
R-square = 0.545 # pts = 365
y = 91.1 + -0.471x
0
10
20
30
40
50
60
70
80
90
100