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Poultry Housing Tips

Do Lower Brooding Temperatures Save You Money?

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It's a fairly typical winter day in the Southeast; it is 50°F and tonight it is going to drop to around 30°F. You are getting chicks today and while, you typically would start off with a house temperature of 92°F and drop it to 85°F by day seven, you just paid last flocks fuel bill and would like to save some money. So you decide to start off with a house temperature of 88°F. The question is are you going to significantly reduce your heating costs?

The primary factor that determines how much it is going to cost to heat a house on a specific day is the average temperature difference between inside and outside. For instance, for the day in question the average outside temperature is 40°F. If we are trying to maintain a house temperature of 92°F, this means we are working with an average temperature differential of 52°F. If we start off with a temperature of 88°F we have reduced the temperature difference from 52°F to 48°F, a reduction of less than eight percent. Since heat flow through the walls and ceilings as well as through ventilation is directly proportional to temperature difference between inside and outside, this means that on day one we would reduce our heating costs by a little less than eight percent

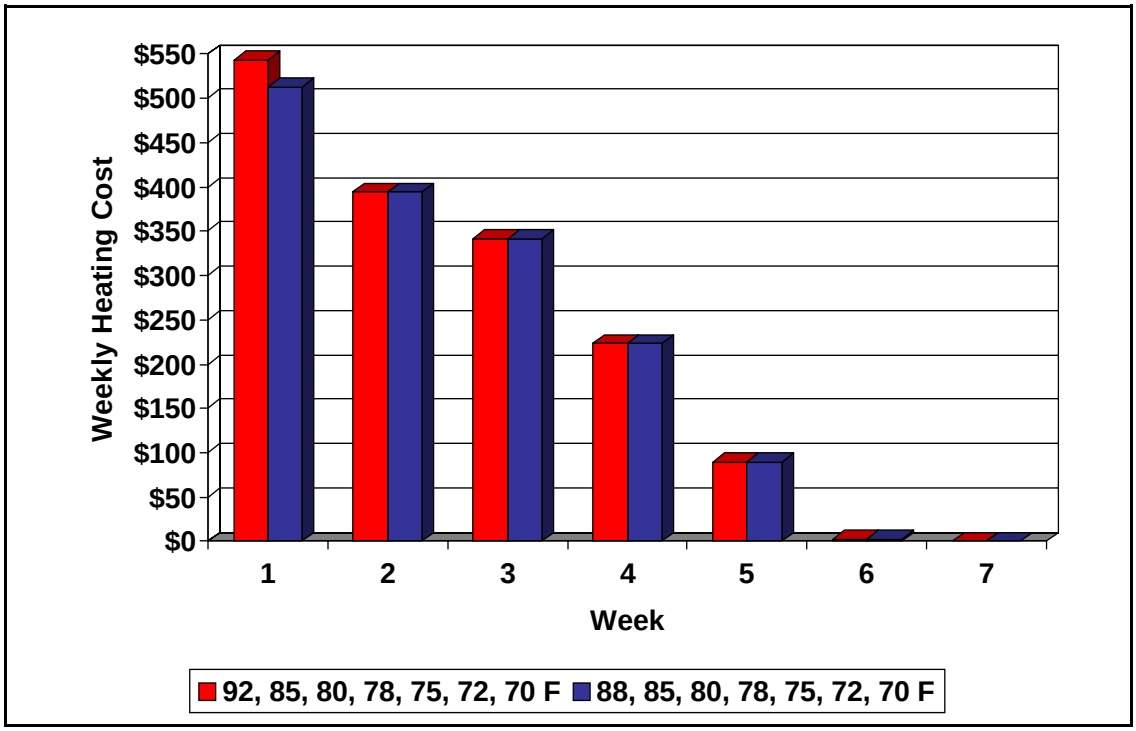

Figure 1. Weekly heating costs for a 40' X 500' curtain-sided broiler house ($1.20 per gallon propane).

PUTTING KNOWLEDGE TO WORK

Now an eight percent reduction in fuel usage can be significant when propane is over a dollar a gallon, but keep in mind the eight percent reduction would only be experienced the first day. Since by day seven the same house temperature would be maintained in either scenario, the fuel savings would decrease each day resulting in an average reduction in heating costs the first week of approximately five percent. Again, not bad but when we factor in the rest of the flock, reducing heating system settings four degrees day one would reduce overall heating costs by less than two percent (Figure 1). The fact of the matter is that even if you were to maintain a five degree lower house temperature for the entire first week you would only reduce your overall flock heating cost by less than five percent, providing the average outside temperature was 40ºF for the remainder of the growout.

Though reducing furnace/brooder settings can reduce your heating costs, it can have a significant effect on chick performance. Chicks that are brooded at low temperatures will eat more feed than those brooded at proper temperatures, but instead of that feed being used for growth, it is being used by the chick to keep warm which will lead to reduced growth rates and poorer feed conversions. Even if proper house temperatures are maintained the remainder of the growout, research has shown birds that have lower seven day body weights due to cold stress will not catch up during the normal growout period. Making matters worse is that mortality and ascites is greater when cooler brooding temperatures are used. The question that producers need to ask themselves is whether enough money is saved by reducing brooding temperature to offset the reduced body weight, higher feed consumption and greater mortality.

While maintaining house temperatures during brooding in the low eighties has been shown to have significant impacts on body weight, feed efficiency, mortality and ascites, it is important to realize even brooding temperatures in the mid eighties can have negative impacts on performance. Studies have demonstrated that brooding at 85ºF vs 90ºF the first week can result in feed conversion differences of two points or more and lower body weights. The high yielding broiler lines being used today are much more sensitive to temperature and respond very well to higher brooding temperatures. This can be demonstrated by the differences of up to four percent in seven day mortality. Chicks that are too cool not only will use more feed to stay warm, but will tend to huddle rather than move about in search of feed and water resulting in a larger percentage of mortality due to starve out.

It is important to keep in mind that when a heating system is set to maintain a house temperature of 88ºF that after you factor in thermostat/controller offsets and stratification, air temperature at floor level will be 85ºF at best. Yes, if you are using some type of radiant heat system (i.e., conventional brooders, radiant brooders or tube brooders) floor temperatures near the brooders will be above 88ºF, but keep in mind that there will always be birds outside the radiant zone of a brooder and therefore their comfort will be determined by air temperature. So even though you believe you are starting off with a temperature of 88ºF, you may actually be brooding chicks in the low eighties.

Figures 2 and 3 were taken in nearly identical houses with three-day-old chicks and provide a good illustration of how lowering heating system setting four or five degrees during brooding can lead to significantly poorer brooding conditions. The radiant brooders in the house in Figure 2 were set to turn on at 84ºF while those in the house in Figure 3 was set to turn on at 88ºF. While floor temperatures directly under the radiant brooders in both houses were above 100ºF, floor temperatures near the feed as well as those near the side wall were significantly different. The lowest floor temperature in the house with the lower heating system settings was approximately 80ºF while in the house with the higher heating setting it was 85ºF. It was obvious to anyone entering the houses that the chicks with the 88ºF heating system setting were more comfortable than those with the 84ºF setting.

It is important to note that there were a couple of other differences between the houses that contributed to the improved conditions in the house in Figure 3. First the radiant brooders were positioned less than five feet off the floor in the house in Figure 2 while those in Figure 3 were approximately six feet. The higher height tended to create a larger radiant heat zone leading to lower temperatures directly under the radiant brooders and higher floor temperatures further from the brooders. The other difference was the brooding area in Figure 3 was equipped with three, 1/15 h.p circulation fans. The circulation fans, which were operating continuously, not only moved the hot air off the ceiling to the floor but also tended to result in significantly warmer side wall floor temperatures by moving the hot air from the center of the house to the side walls. The fact is that the slightly increased fuel usage in the house with the higher heating system thermostat settings was more than likely offset by reduced fuel usage due to the increased hot air utilization offered by the mixing fans.

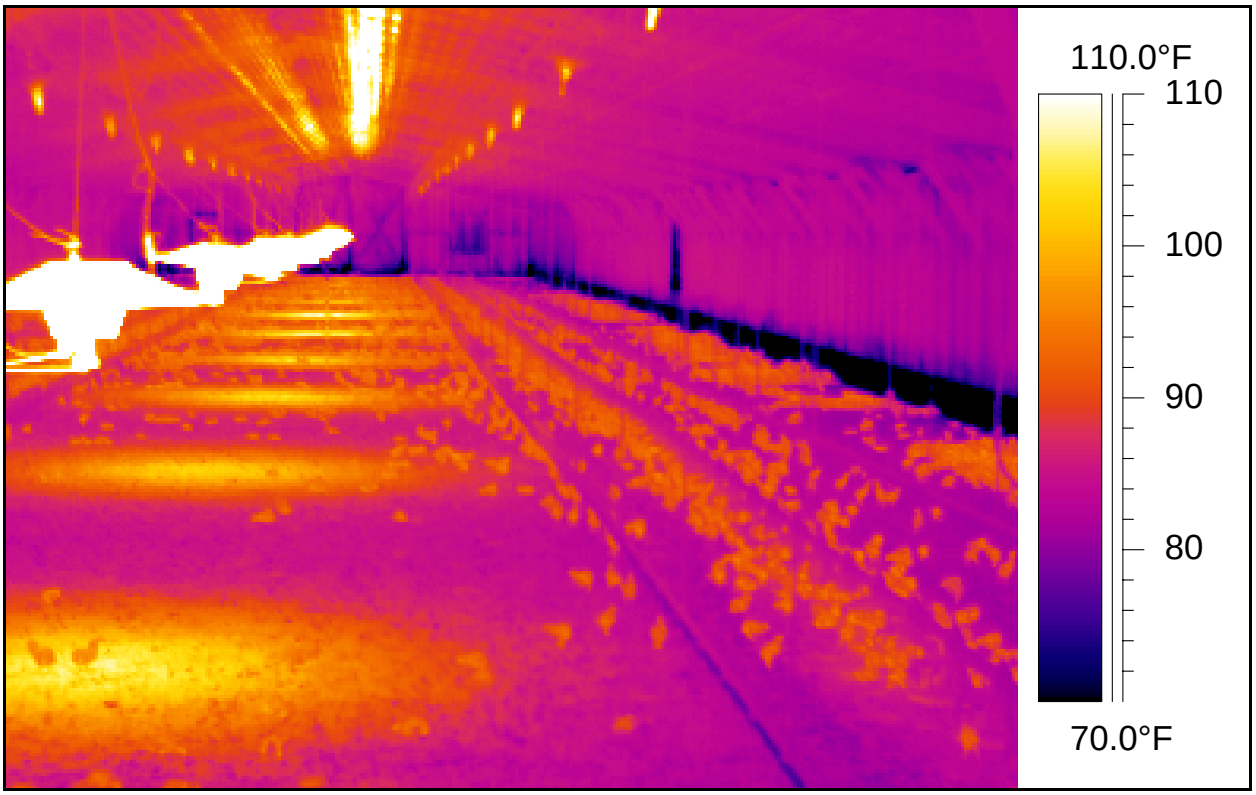

Figure 2. House with three-day-old chicks (84°F heating system setting)

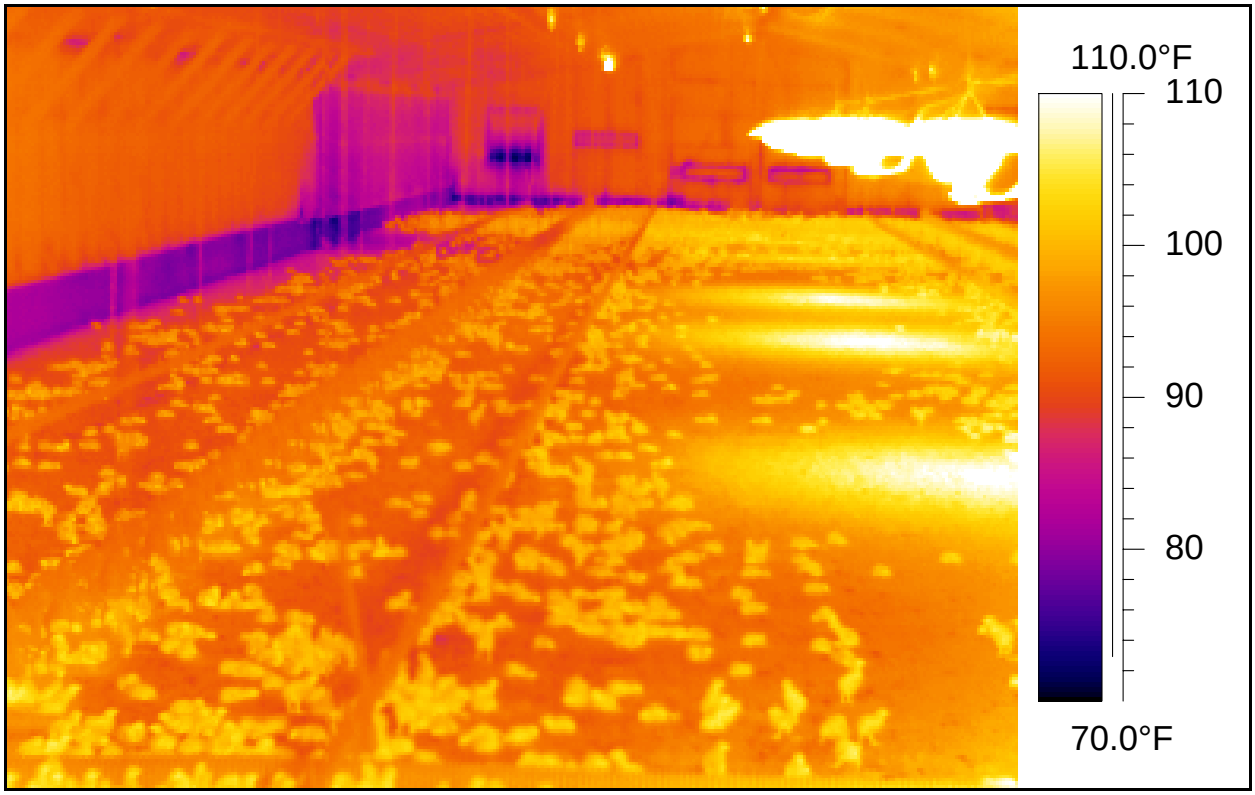

Figure 3. House with three-day-old chicks (88°F heating system setting)

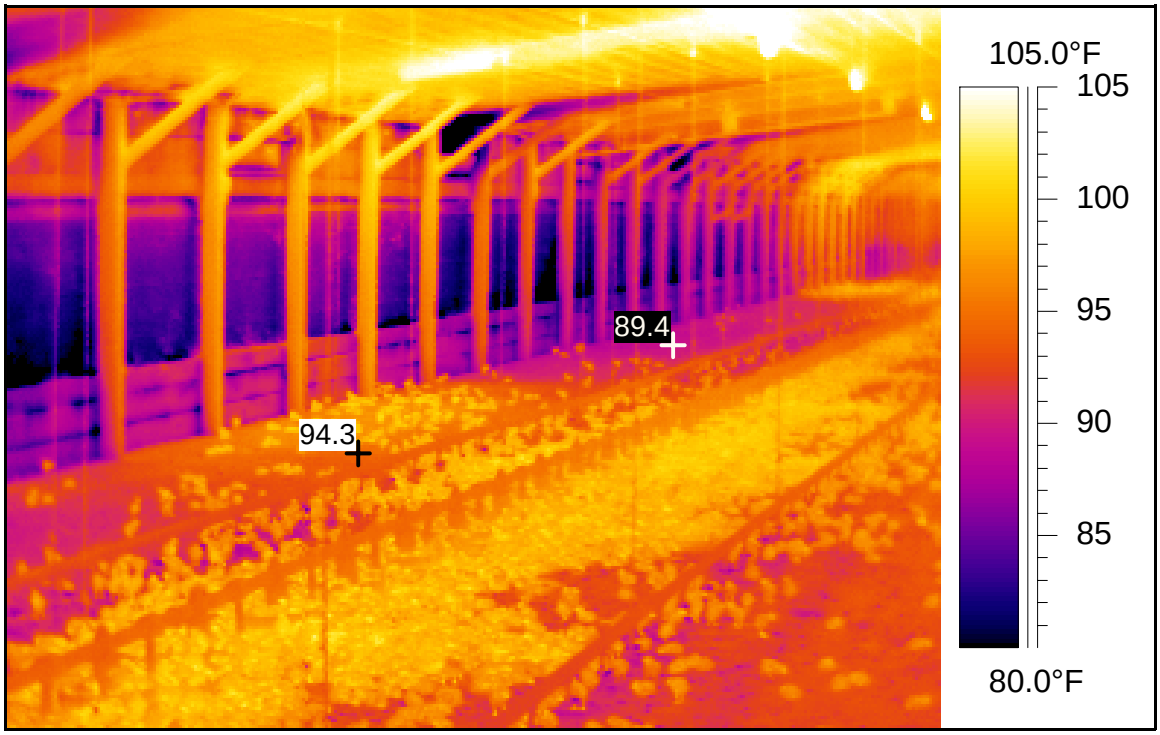

Figure 4. Floor temperatures in house with forced air furnaces

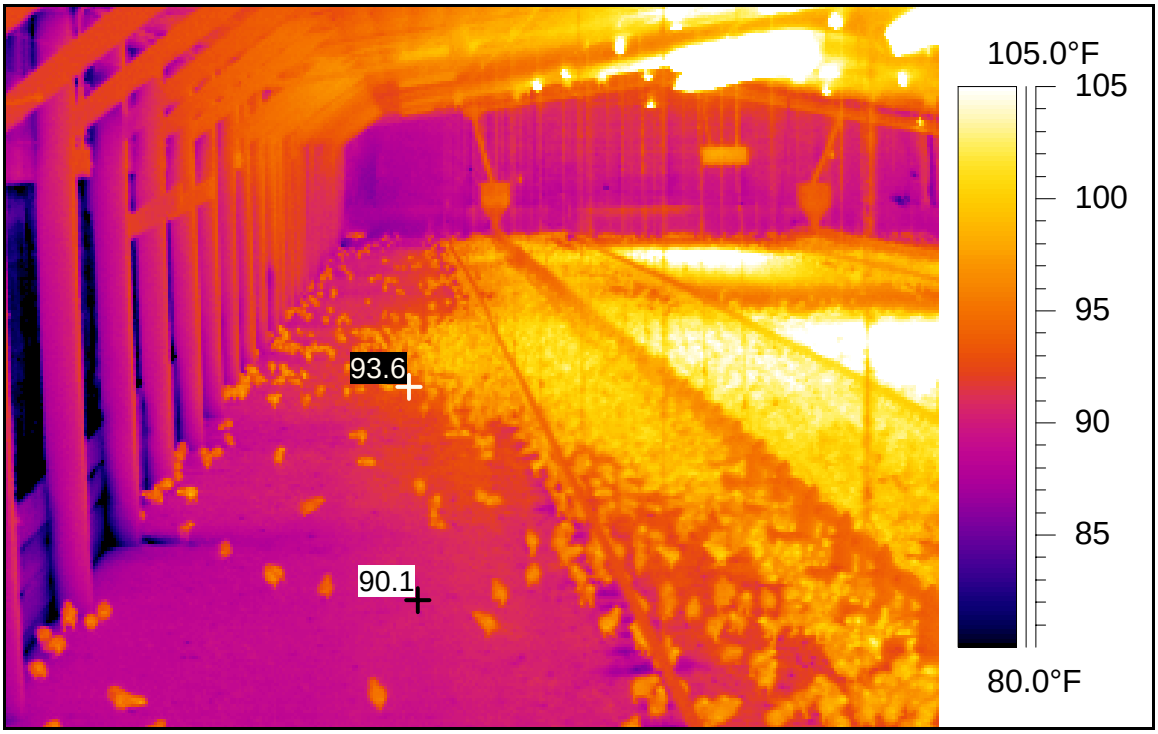

Figure 5. Floor temperatures in house with radiant tube brooders.

Figures 4 and 5 are other examples of how slight differences in temperature can have a significant effect on day-old-chick comfort. In Figure 4 the hot air from the forced air furnace moved across the ceiling and rolled down to the floor on the opposite side of the house creating a “hot spot” where chicks tended to congregate. The hot spot was only five degrees warmer than the floor a few feet away where few chicks were present. Figure 5 taken in a house with radiant tube brooders shows yet again how a floor temperature a few degrees warmer can be significantly more attractive to young chicks.

The truth is the best way to reduce heating costs is to make sure that excessive fresh air is not brought into a house during brooding. For instance, increasing minimum ventilation from 2,000 cfm to 3,000 cfm, either intentionally or unintentionally through leakage, increases house heating requirements by approximately 25% which is far more than what is seen when decreasing heating system settings a few degrees. Producers should concentrate on getting their houses as tight as possible and using litter treatments to reduce ammonia levels thus reducing the need for excessive ventilation. These steps will not only lead to reduced heating costs, but improve chick performance as well.

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