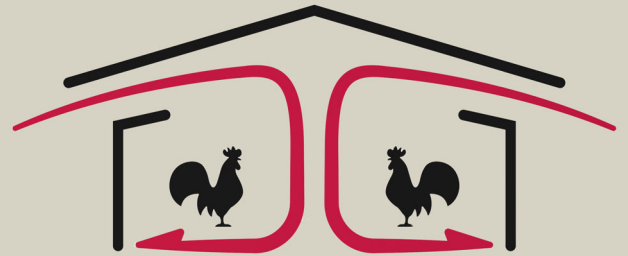




Poultry Housing Tips

Next Generation Low-Intensity Radiant Tube Heaters

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The brooding area of most broiler houses requires a heating system capable of providing between 40 and 60 Btu's/hr to maintain an air temperature in the low 90's during cold weather. For instance, a 54' X 250' brooding area would typically require a heating system capable of producing between 675,000 BTU/hr (54' X 250' X 40 BTU/hr = 540,000 BTU/hr) and 810,000 BTU/hr (54' X 250' X 60 BTU/hr = 810,000 BTU/hr) depending on climate and house construction. One important factor that is left out in this method of determining a broiler house's heating system requirements is heat distribution. Though it is possible for a single heater to produce sufficient heat, the question is whether it would be able to distribute the heat evenly throughout the aforementioned 54' X 250' brooding area. For this reason, it is generally recommended that multiple heaters are used and that they be a maximum of 100' a part. So if a producer wanted to be able to supply 810,000 BTU's/hr of heating capacity and use 250,000 forced air heaters, to do so a minimum of four units would typically be required to meet both the BTU/hr per square foot and heater spacing requirements.

Radiant heaters add an additional level of complexity to heating system design. With a radiant heater, not only are we looking to distribute the hot air produced by the heating system throughout the brooding area, but we are also looking to distribute the radiant heat produced by the heaters relatively evenly throughout the brooding area. The radiant heat doesn't have to be perfectly uniform because a gradient of floor temperatures is desirable, enabling the chicks to choose from a variety of floor temperatures to find their comfort zone. Smaller or weaker chicks might want slightly higher floor temperatures. Larger, faster-growing chicks may prefer slightly lower floor temperatures. That being said, it is generally unnecessary to have areas of the house with floor temperatures much above 100°F. Chicks tend to avoid these areas because it is simply too hot for them. In

addition, having excessive hot spots will tend to reduce the overall heating efficiency of a house because the heat is being wasted heating the floor more than necessary.

For instance, a producer could opt for eight, 80,000 BTU/hr, 20'-long radiant tube heaters or eight 20'-long, 80,000 BTU/hr radiant tube heaters. Both systems would be capable of generating the same air temperature throughout a brooding area on a cold morning, and the average floor temperature would be similar. However, the floor temperature uniformity would be significantly different. The house with fewer radiant tube heaters would tend to have some areas where the floor temperature is too hot for the chicks and other areas farther from the tube heaters where the floor temperatures could be too cool. The house with the greater number of lower output heaters would tend to produce far more uniform floor temperatures and though the system may initially cost more, chances are it would have lower operating costs.

A recent study examined how improving radiant heat distribution in broiler houses could potentially affect chick comfort and heating costs. The study was conducted using four 54' X 500' commercial broiler houses. All four houses were equipped with a similar brooding area heating system capacity (560,000 vs 640,000 BTU/hr). The primary difference between the houses was the length of tube heaters used. Two houses were equipped with seven 20'-long (80,000 BTU/hr) radiant tube heaters installed along the centerline of the brooding area, while the two other houses were equipped with eight 40'-long (80,000 BTU/hr) tube heaters installed in two rows of four, approximately 18' from each side wall.

The 40' tube heaters (SRP ALTX80) used in this study were selected in part due to their unique ability to distribute radiant heat evenly along the tube length, which has traditionally been a challenge with

some longer tube heaters. By spreading the same 80,000 BTU/hr of heat along a tube twice as long, the 40' tube heaters didn't tend to generate excessive floor temperatures beneath them, which allowed the tube heaters to be installed within six feet of the outer feed lines and two feet from the second row of drinker lines without fear of running chicks off the feed and water during cold weather.

Positioning the two rows of "low intensity" tube heaters closer to the side wall has several advantages:

- 1) It puts more radiant heat on the litter in an area of the house where excessive litter moisture tends to be more of an issue.
- 2) It places the tube heaters closer to the cold incoming air from the side wall inlets, which quickens its heating on the way to the center of the house.
- 3) It helps to quickly warm the cold air leaking in through cracks in side walls faster than when radiant tube heaters are installed along the centerline of a house.

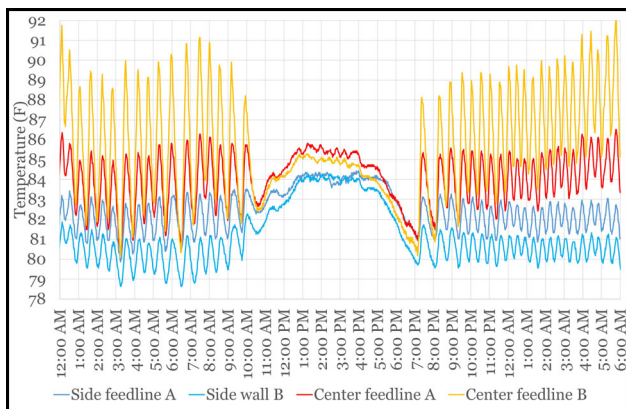


Figure 1. One row of 20'-long, 80,000 BTU/hr radiant tube heaters

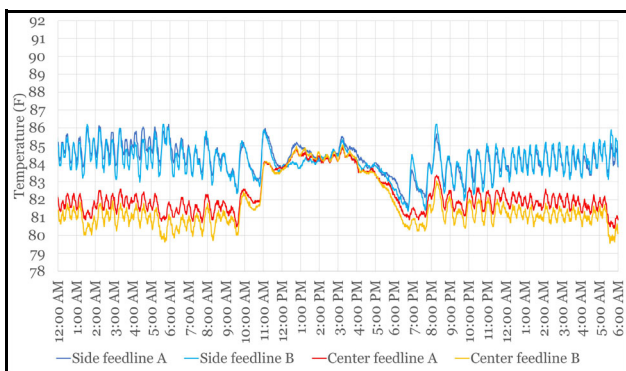


Figure 2. Two rows of 40'-long, 80,000 BTU/hr radiant tube heaters

Preliminary results from a recent study underscore the benefits of a well-designed radiant heating system in broiler houses. The use of two rows of low-intensity radiant heaters has proven to be more effective in creating uniform floor temperatures during brooding.

On cold mornings, the chicks in the house with the 20' tube heaters tended to avoid the center of the house. In contrast, the chicks in the house with the 40' tube heaters were more evenly distributed from wall to wall and did not tend to avoid the areas directly under the tube heaters. Temperature data loggers positioned along the two outside feed lines as well as the inside drinker lines revealed that during brooding, temperature variations were typically less than 5°F in the house with the 40' tube heaters and often 10 - 15°F in the houses with 20' tube heaters (Figures 1 and 2). Thermal images taken in the houses during brooding found a significant portion of floor temperatures in the center of the houses with the 20' tube heaters was over 100°F (Figure 3 and 4), whereas floor temperatures in the houses with the 40' tube heaters were much more uniform and rarely exceeded 95°F even directly beneath the heaters. Heater runtime during the first week was 10 - 20% lower for the houses with the low-intensity 40' tube heaters compared to the houses with the traditional 20' tube heaters. Though the results are preliminary, they do show the advantages of paying attention to not only BTU/hr per square foot, but also radiant floor coverage area and uniformity when installing radiant tube heaters.

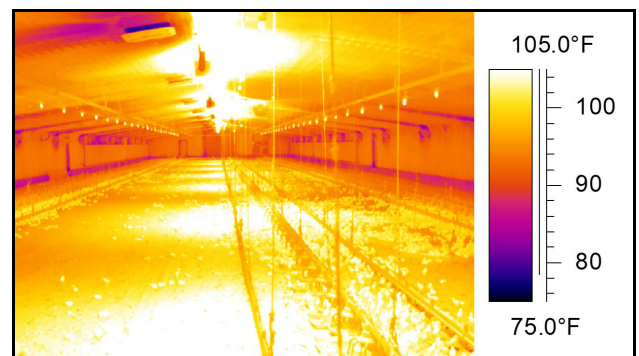


Figure 3. Single row of 20'-long, 80,000 BTU/hr radiant tube heaters.

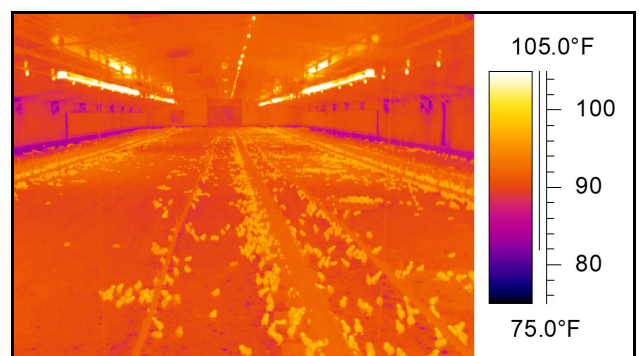


Figure 4. Two rows of 40'-long, 80,000 BTU/hr radiant tube heaters

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