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Fuel Savings with Radiant Brooders

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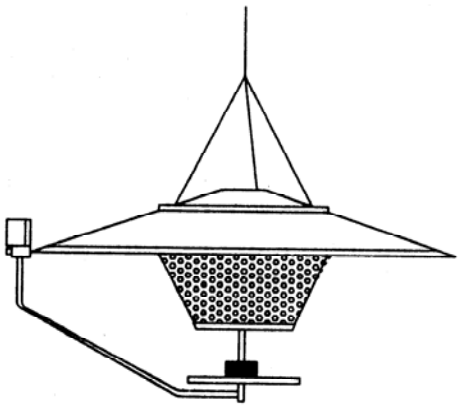
A new type of brooder is causing some broiler producers to take another look at an old concept, radiant brooding. The new radiant brooders look very similar to conventional pancake brooders except for the size of the radiant element. Instead of the small ceramic disk associated with pancake brooders, radiant brooders have large radiant elements made of stainless steel. The element is shaped like a cone with the top cut off. The one foot diameter cone is approximately one foot in height and glows a deep red when operating. Radiant brooders produce approximately 25% more heat than traditional pancake brooders (40,000 Btu's/hr vs 30,000 Btu's/hr). Though the radiant brooders are a relatively new concept to U.S. poultry producers, they have been used extensively in Europe and Australia for a number of years.



The new radiant brooder has significant improvements over its predecessor, the pancake brooder. The large radiant element and high burner output increase the amount and intensity of the radiant heat the brooder puts off. This allows the brooder to be mounted high off the floor (5' to 6'), distributing its heat over a wide area. Since each brooder covers more floor area, about half as many are needed. The brooders have better, more sophisticated controls and can be controlled with detachable thermostats or zone controlled with any of the new fan/heater controllers.

PUTTING KNOWLEDGE TO WORK

Field Demonstration

Over the past year the new radiant brooders have been used on The University of Georgia's Energy Efficient Broiler Production Farm. Direct comparisons have been made between these brooders and traditional forced air furnaces. Records have been kept on daily fuel usage, house temperatures, and chick mortality. Bird reaction to the brooders was also noted.

The 34' X 400' curtain-sided broiler houses on the demonstration farm have drop-ceilings insulated with 3 1/2 inches of fiberglass-bat insulation. The sidewall above the 32" curtain, as well as endwalls, are insulated with 3/4" Styrofoam board insulation. The houses are typically power-ventilated through the use of sidewall inlets and exhaust fans. Exhaust fans and furnaces\brooders are operated through the use of a stage environmental controller.

One of the houses is equipped with thirteen radiant brooders, nine on the brooding end and four on the nonbrooding end. The brooders in the brooding end are located above each of the feed lines. Brooders are on 40 foot centers and the two rows are staggered 20 feet. The brooders in the rear of the house are evenly spaced down the center of the house. A second identical house has three, evenly spaced, 168,000 Btu/hr, forced air furnaces in the brood end and two in the nonbrooding end.

Heating Ability

Though the house with the radiant brooders had significantly less heating capacity, 40 percent less, this has not presented a problem during any of the growouts. In fact, the radiant brooders had no problem warming the house to 86°F during one winter growout when outside temperature was below 10°F.

There are a few different reasons why no problems were encountered keeping the birds comfortable despite the difference in heating capacity. First, most houses with forced air furnaces have more heating capacity than they will ever need. If a house is tight and well insulated it doesn't require 500,000 Btu's/hr of heating capacity to keep a brooding area 85°F to 90°F even when it is well below freezing outside. One of the reasons why three to four furnaces are typically installed in a 200' to 250' brood area is to insure even distribution of the heated air. You may have noticed that with two furnaces in a nonbrooding end of the house that there can be cold spots when it is cool outside.

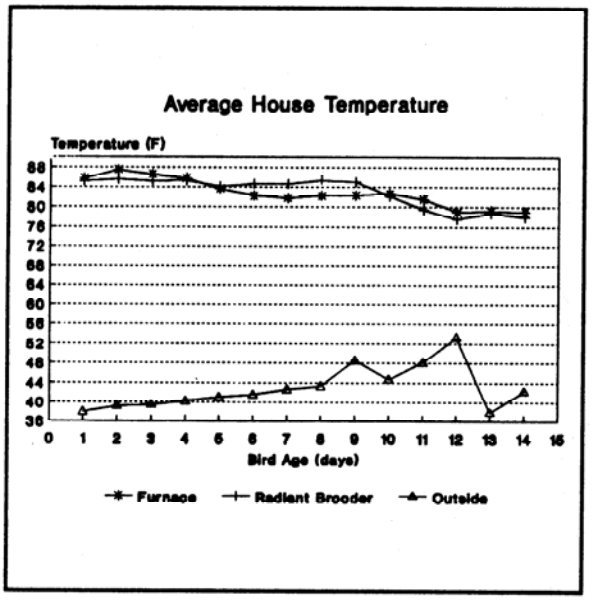
A second reason for the excess heating capacity has to do with economics. There are typically two sizes of forced air furnaces, 180,000 and 100,000 Btu's/hr. In many cases there is less than a 10 percent difference in price between the two. The larger unit gives the producer a margin of safety as the house becomes less tight and insulation degrades over time. Furthermore, if a furnace goes out, the producer has enough reserve capacity to keep the birds comfortable in almost any situation.

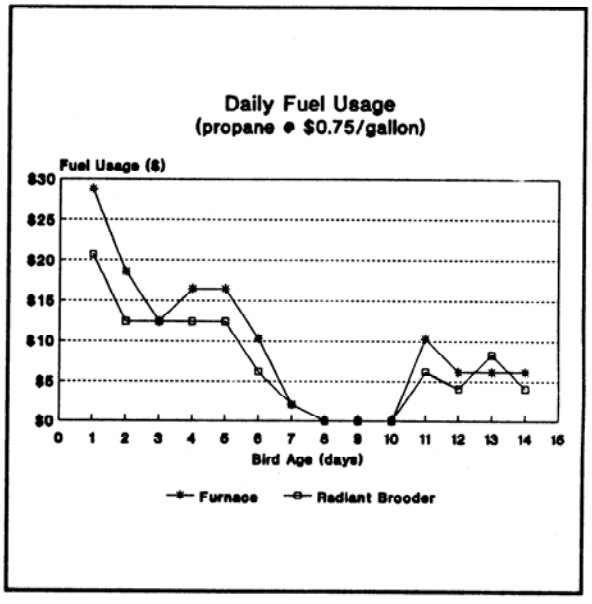
Heating Efficiency

A third reason why the radiant brooder house was able to keep the birds warm with less heat has to do with the heating efficiency of the radiant brooder. In a forced air furnace, a flame heats the air, which in turn, heats the birds. Though a radiant brooder does a significant amount of air heating, approximately 30% of its heat is transferred directly to the floor and the birds. Furnaces have to do all their heating via the air; radiant brooders are able to do a large portion of their heating directly without having to heat up the air. Just like in outlet stores and mail order catalogues, if you take out the middle man, the process is more efficient and you save money. Furthermore, since the birds are receiving a portion of their heat from radiant energy, houses can be kept at lower temperatures without affecting bird performance. It is not uncommon for a house with radiant brooders to be kept 5 or more degrees cooler than a conventional, forced air furnace house. Since the house is kept cooler less heat is lost through the sidewalls and ceiling; therefore, less heat is required.

Fuel Savings

The increased efficiency of the radiant brooders and slightly lower house temperatures has led to fuel savings over the past year of 15% to 25%. The graphs below show indoor as well as outdoor air temperatures during the first 14 days of a growout which began the last week of December. As you can see the house with the radiant brooders had comparable air temperatures but used significantly less fuel.





Bird Reaction

The young chicks reacted favorably to the radiant brooders. Instead of the small "donuts" associated with traditional pancake brooders, the birds in the house with the radiant brooders would form circles approximately 20' in diameter. Chicks in general appeared to spread out more rapidly in the house with the radiant brooders. Chicks in the house with the forced air furnaces had more of a tendency to group next to the feeders. These observations made it appear that chicks raised under radiant brooders were more active. Over the past two years two week mortality has been slightly, but consistently lower in the house with the radiant brooders.

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