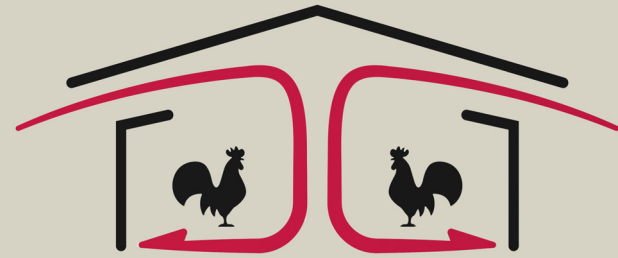




Poultry Housing Tips

Radiant Brooder Coverage Area - Part I

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A modern radiant brooder warms a house in two important and very different ways: it produces hot air which allows proper brooding temperatures to be maintained and radiant heat which warms the floor and chicks above air temperature. Approximately 45% of the heat produced by a radiant brooder is in the form of radiant heat and 55% is in the form of hot air (Figure 1).

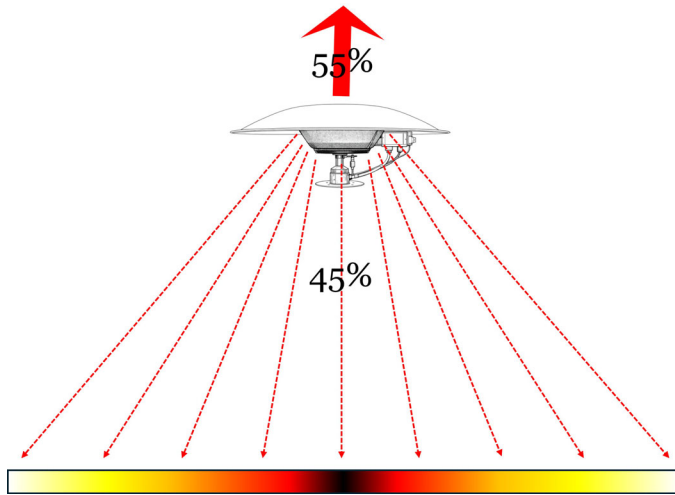


Figure 1. Radiant brooder: air vs. floor heating

The degree to which the floor is warmed by a radiant brooder varies with distance from it. This is not that different from a light bulb, where the amount of light a chick receives varies with distance from the light bulb. We express the amount of light a chick receives from a light bulb in lumens per square foot or more commonly referred to as foot*candles. We express the amount of radiant heat, which is just a different type of light we can't see, a chick receives from a radiant brooder in BTU/hr per square foot. As a general rule chicks are not warmed significantly when the level of radiant heat they are exposed to drops below 10 BTU's/hr*ft². Conversely, chicks will generally move out of an area when the level of radiant heat increases above approximately 100 BTU's/hr*ft². To put this in perspective during brooding when the level of radiant heat exceeds 100

BTU's/hr*ft² typically result in floor temperatures above 105°F which chicks will only tolerate for short period before moving away. As you might expect, the precise amount of radiant heat a chick or older bird will seek will depend on age, health, air temperature, relative humidity, drafts, etc.

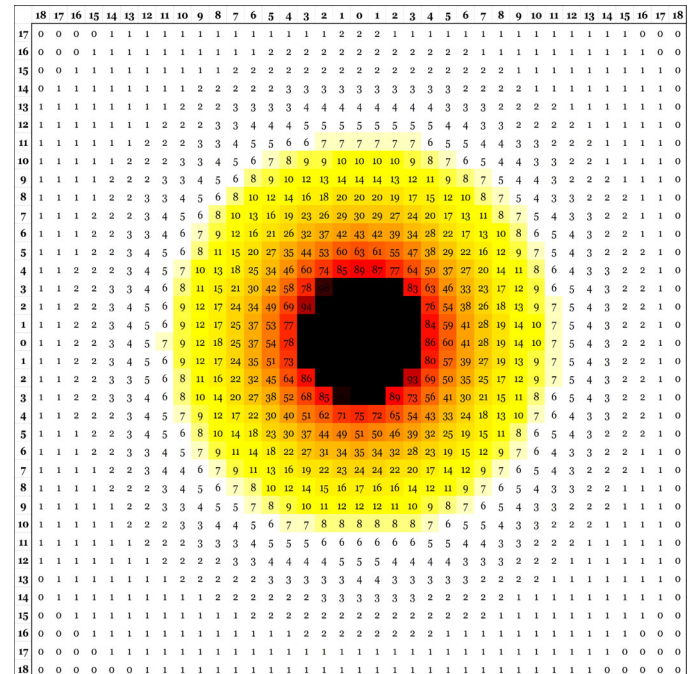


Figure 2. Radiant heat coverage area of 40,000 BTU/hr radiant brooder installed 6' above the floor

Figure 2 provides an illustration of the radiant floor heating pattern of a typical radiant brooder installed six feet above the floor (measured from the bottom lip of the canopy). Each value shown represents the amount of radiant heat each 1' X 1' area beneath the radiant brooder is receiving when the brooder is operating. The diameter of circular the area beneath the radiant brooder that is receiving at least 10 BTU's/hr*ft² of radiant heat is approximately 20'. There is a smaller circular area directly under the brooder with a diameter of approximately 6' where the level of radiant heat would be over 100 BTU's/hr*ft² that birds would tend to avoid, especially if the brooder was operating continuously.

The effective radiant floor heating can be defined as the total square footage beneath the brooder that is receiving between 10 and 100 BTU's/hr*ft² which in this instance would be approximately 300 ft². Outside this zone, chicks are being warmed by the hot air produced by the brooder; inside this zone, the chicks are being warmed by both the hot air produced by the brooder and the radiant heat produced by the brooder. The closer a chick moves towards the center of the zone, the more they are warmed by the radiant heat produced by the brooder, and the less important the actual house air temperature becomes for their comfort.

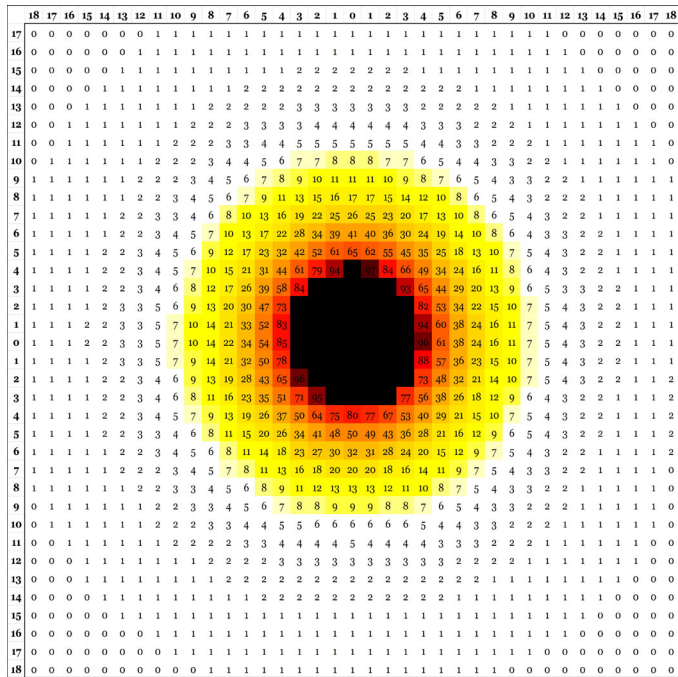


Figure 3. Radiant heat coverage area of 40,000 BTU/hr radiant brooder installed 5' above the floor

Like light from a light bulb the distribution of radiant heat from a radiant brooder is affecting by installation height. Figure 3 illustrates the effective radiant coverage area of a radiant brooder installed at a height of 5', while Figure 4 illustrates an installation height of 7'. Reducing the installation height to 5' reduces the coverage area to 255 ft². The coverage area is reduced not only because it is smaller in diameter, approximately 18' vs. 20', but also because the area receiving excessive radiant heat underneath the brooder is increased, thus reducing the amount of floor area the birds will utilize. Conversely, increasing the installation height to 7' increases the effective radiant coverage area to 365 ft². The effective coverage area is increased not only because the radiant coverage area is increased (approximately 22' in diameter), but the area near the brooder that is receiving excessive radiant heat is reduced, thereby increasing the total usable space for the birds.

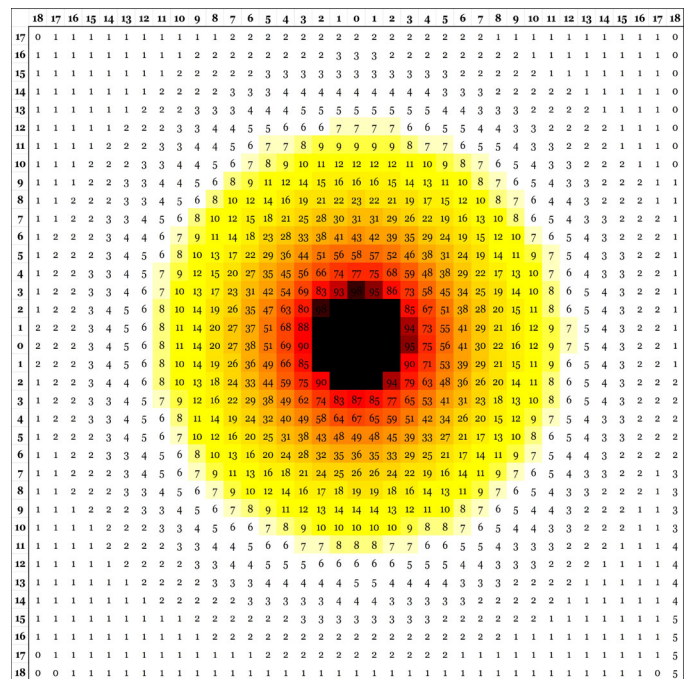


Figure 4. Radiant heat coverage area of 40,000 BTU/hr radiant brooder 7' installed above the floor

It is important to keep in mind that the amount of radiant heat nor hot air delivered to the floor doesn't change with installation height. The hot air produced by a radiant brooder is moving toward the ceiling at speeds of over 100 ft/min. As a result positioning a radiant brooder closer to the floor will not help deliver warm air down to bird level. Likewise, whether a radiant brooder is positioned four feet or ten feet above the floor will not change how much radiant heat is delivered to the floor, only concentrate the radiant heat in a smaller area. Quite simply, the lower a radiant brooder is positioned above the floor the fewer the number of birds that will potentially benefit from the radiant heat produced by the brooder.

Radiant brooders provide chicks with a flexible and self-regulating heat environment that combines warm air with a variety of floor temperature to choose from. As a result it is important to understanding how radiant intensity changes with distance and installation height so that the usable floor space can be maximized. Properly installed and managed, a radiant brooder creates a broad comfort zone where chicks can easily move to the level of warmth they prefer, reducing reliance on precise air temperature control and promoting uniform chick comfort and performance during the critical brooding period.

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