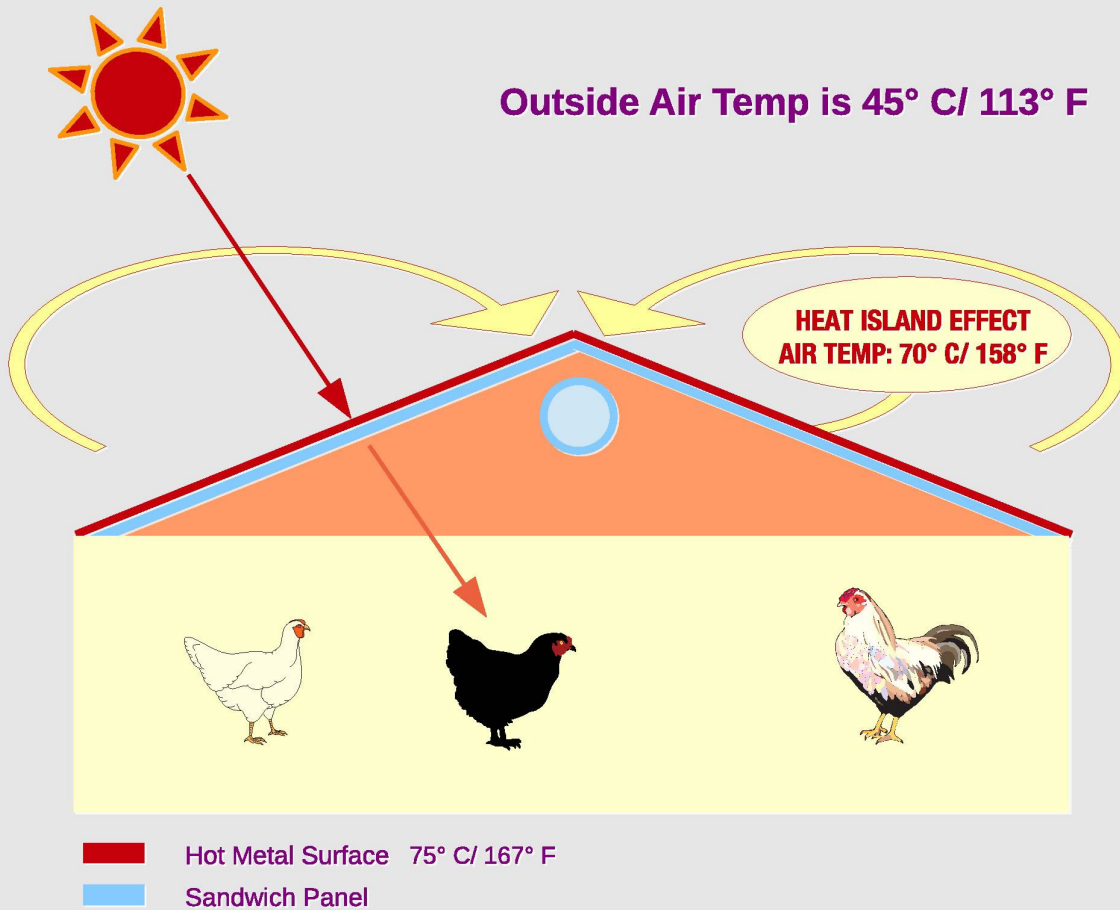


Benefits to Poultry Facilities



When the outside air temperature is 45° Celsius/ 113° F, Metal Roof heats up to 75 to 80° Celsius. Heat Island Effect kicks in, with the air temperature surrounding the building rising up to 70-75° Celsius.

The fresh air, taken in by the Ventilation/ HVAC system is at 70° C/ 158° F. This could run up a high Energy Bill if Climate Control is done through chiller units.

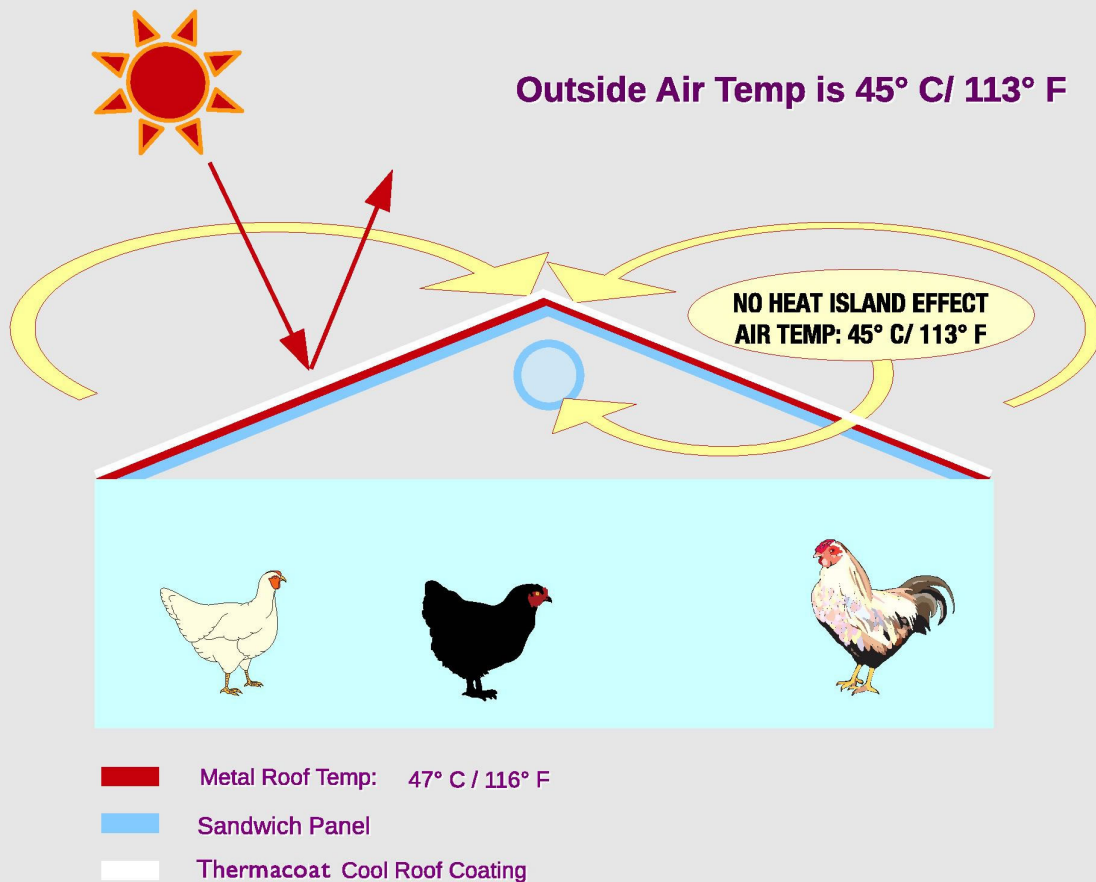
The flip side of a combination of a hot metal roof and bulk insulation is, the heat taken in, does not dissipate through the metal roof, with the Glasswool/ Rockwool, Polystyrene, Polyurethane based Bulk Insulation sandwich panels, trapping the heat in – as a Thermos/ Hot Lunch Box!

Heat Island Effect References:

- <http://heatisland.lbl.gov/> 
- <http://www.epa.gov/heatisd/about/index.htm> 

Do not get rid of the Sandwich Panel, a Cool Roof System on a Metal Roof in combination with Sandwich Panel changes the Climate Control equation.

Benefits to Poultry Facilities



Cool Roof by Thermacoat (due to high Solar Reflective Index of SRI 110 to SRI 99, which functions on the basis of "Reflectivity of the best white surface and emissivity of the best black surface") prevents the Metal Roof from heating up. This prevents excessive Heat Build Up around the building, ensuring lower temperature of air that is taken in.

SRI value of 100 means ZERO Solar Heat Gain.

The High Emissivity of Thermacoat will also mean faster dissipation of heat, reducing the tendency for the unit to be a Hot Lunch Box.

- ✓ Better Feeding Efficiency
- ✓ Happy Birds and Chicks
- ✓ Reduced Mortality Numbers
- ✓ Considerable Energy Savings
- ✓ Much Healthier Environment

POULTRY: HEAT STRESS & AMBIENT TEMPERATURE

12.8° to 23.9°C	Thermal neutral zone. The temperature range in which the bird does not need to alter its basic metabolic rate or behavior to maintain its body temperature.
18.3° to 23.9°C	Ideal temperature range
23.9° to 29.4°C	A slight reduction in feed consumption can be expected, but if nutrient intake is adequate, production efficiency is good. Egg size may be reduced and shell quality may suffer as temperatures reach the top of this range.
29.4° to 32.2°C	Feed consumption falls further. Weight gains are lower. Egg size and shell quality deteriorate. Egg production usually suffers. Cooling procedures should be started before this temperature range is reached.
32.2° to 35°C	Feed consumption continues to drop. There is some danger of heat prostration among layers, especially the heavier birds and those in full production. At these temperatures, cooling procedures must be carried out.
35° to 37.8°C	Heat prostration is probable. Emergency measures may be needed. Egg production and feed consumption are severely reduced. Water consumption is very high.
Over 37.8°C	Emergency measures are needed to cool birds. Survival is the concern at these temperatures

METHODS OF HEAT LOSS

During the summer months, when daily temperatures regularly reach **35° to 37.8°C**, it becomes critical for the birds to dissipate body heat to the surrounding environment. Poultry do not sweat and therefore must dissipate heat in other ways to maintain their body temperature at approximately **40.6°C**. Body heat is dissipated to the surrounding environment through radiation, conduction, convection, and evaporation. The first three avenues are known as sensible heat loss; these methods are effective when the environmental temperature is below or within the thermal neutral zone of the bird (**12.8° to 23.9°C**). The proportion of heat lost through radiation, conduction, and convection depends upon the temperature difference between the bird and its environment. The bird loses heat from surfaces such as wattles, shanks, and unfeathered areas under wings. To maintain body temperature by sensible heat loss, the bird does not need to drastically alter its normal behavioral patterns, feed intake, or metabolism. The purpose of poultry house ventilation is to maintain a high enough air velocity or a low enough temperature in the house that the birds can maintain body temperature by sensible heat loss.

At an environmental temperature of **28°C** appetite is depressed by **12%** and where high relative humidity is also present, by as much as **50%**.

SENSIBLE HEAT LOSS METHODS

Radiation

Flow of thermal energy without the aid of a material medium between two surfaces. All surfaces radiate heat and receive radiation back; the net radiation heat flow is from higher to lower temperature surfaces.

Conduction

Thermal energy flow through a medium or between objects in physical contact. Direction of energy transfer depends on a temperature gradient; heat moves from areas of higher to lower temperature.

Convection

Heat flow through a fluid medium such as air; thermal energy moves by conduction between a solid surface and the layer of air next to the surface, and the thermal energy is carried away by the flow of air over the surface. Energy transfer to the air depends on temperature and movement of air across the skin surface; heat is transferred to air moving across the skin surface if the air is at a lower temperature than the skin.

LATENT HEAT LOSS METHOD

Evaporation

The transfer of heat when a liquid is converted to a gas; when water is converted from a liquid to a vapor, heat is utilized. Energy transfer is influenced by the relative humidity, temperature, and air movement; heat is transferred from the animal's body to water, turning it to water vapor.

Once the environmental temperature reaches approximately **25°C**, the method of heat loss begins shifting from sensible to evaporative heat loss. Dissipation of body heat by the evaporative process requires the bird to expend energy by panting (hyperventilation), which begins to occur at about **26.7°C**.

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