Hot Weather Management in the Poultry House

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Heat stress can result in significant losses to producers with all types of poultry. The most obvious loss is due to mortality. Dead birds can be counted and a dollar value assessed. Unfortunately, there are other losses in production efficiency, such as reduced growth rate, egg production, shell quality, and egg size and hatchability, which are very real. All are much more difficult to evaluate. Poultry producers should be aware that losses in production efficiency will occur long before significant mortality rates are observed. The purpose of this publication is to provide guidelines to minimize heat stress in poultry houses.

Building

A number of features of the building, such as orientation, amount of insulation, and amount of roof overhang, have a direct bearing on inside temperatures. The orientation of the building should be such that prevailing winds are used to an advantage and such that the sun does not shine directly into the building. In Oklahoma an east-west orientation will usually accomplish both objectives.

If roof insulation was not included at the time of construction, adding it later could certainly help prevent the sun's radiant heat from causing increases in internal house temperatures. Insulation would also be beneficial in the cold months to help conserve heat. An R value of 18 is recommended for Oklahoma, and insulation should extend to the end of the roof overhang to prevent radiant heat penetration through the sidewalls. The correct length of roof overhang can also prevent direct sunlight from entering the house. In Oklahoma the overhang should extend at least two feet beyond the sidewall. In buildings with insulated ceilings adequate ventilation should be provided above the ceiling. In this way a heat buildup, which would reduce the effectiveness of the insulation, would be prevented. The extra ventilation would also eliminate moisture problems in winter.

Site Management

In existing housing there are some important factors to consider when attempting to maximize air movement around the building. Grass and weeds should not be allowed to grow over six inches tall, low overhanging tree limbs should be removed, and crops which tend to be tall should not be planted near the building. Any trash or debris that is around the building should also be removed. A good stand of mowed grass or even mowed weeds around the building tends to reduce the heat that is reflected toward the inside.

Ventilation

Proper ventilation is essential in minimizing the effect of heat. Birds don't sweat and depend on losing heat through respiration and releasing heat from surfaces such as wattles, shanks, and unfeathered areas under the wings. Increasing air movement will help birds lose excess body heat.

In curtain-sided houses with no mechanical ventilation, the curtains should always be adjusted to allow maximum air movement. If proper ventilation is achieved the incoming air will be well distributed in the center of the house as shown in Figure 1. The distribution of that air to pick up heat and moisture before it leaves the house will improve bird comfort. Nothing should be inside the house that would restrict the flow of air. Fans to move the air inside the house may also be necessary.

In houses with curtains on the sides and exhaust fans to improve ventilation, curtain height and fan controls must be carefully coordinated in order to maximize air flow and at the same time achieve maximum benefit from the moving air (Figure 2). Fans to create air movement inside the house may also be needed. Circulation fans can be 1750 rpm unrated units, but should have sealed motors.

In houses that are environmentally controlled and depend entirely on fans in the sidewalls to exchange air, the uniformity of air distribution depends on the location, design, and adjustment of the air inlets. The longest path of air from inlet to outlet should not exceed approximately 75 feet.

Air inlet control is critical to good distribution. The size of the inlet should change each time there is a major change in ventilation rate. Depending on outside temperatures, manual baffle adjustments may be required several times per day. Accuracy of ventilation rates may be improved through the use of manometer controlled winches on the curtains or baffles.

The fans in all three types of houses should be spaced about every 25-30 feet and should be directed horizontally. The objective of the fans is to provide air movement around the birds; therefore, location and spacing should be determined by the results of the air movement. In order to save

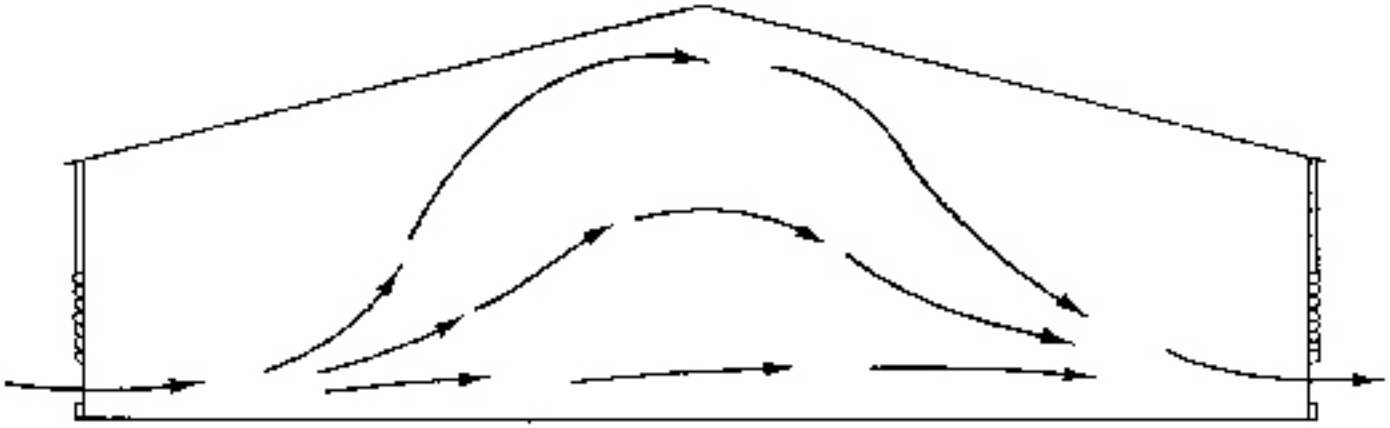

Figure 1. Arrows show proper air flow in a curtain sided house with no mechanical ventilation. Curtains controlled from the top should be adjusted to provide a similar air pattern.

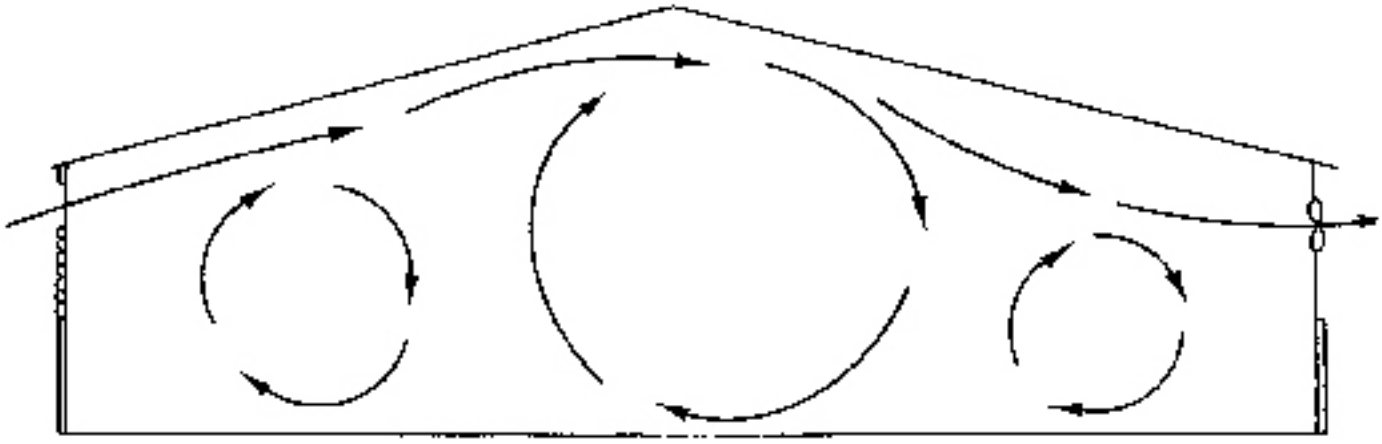

Figure 2. Arrows show proper air flow in a curtain sided house with mechanical exhaust fans.

energy, all space fans should be controlled by a thermostat set at approximately 80 degrees F. By using a relatively high setting, the fans run only when temperatures begin to rise and additional air movement is needed. All fans should have guards and safety shields to prevent birds from getting in the fans and to protect employees.

Proper maintenance of fans is essential to insure maximum benefit. Blades and louvers should be cleaned regularly and proper belt tension maintained to maximize the efficiency. Cleaning of poultry netting on the sides of the house may also be needed to improve air flow.

Evaporative Cooling

Evaporative cooling can be an effective way to provide birds some relief from the heat. The limiting factor with this system is the outside humidity since the evaporation rate determines effectiveness. Evaporative coolers use heat from the air to vaporize water. This increases the relative humidity, but lowers the air temperature.

The most efficient evaporative cooling system is the “fan and pad” system, in which all incoming air passes through a moist pad. If properly designed, the fan and pad systems should reduce air temperatures to within five degrees of the temperatures listed in Table 1. As an example, air at 100 degrees F and 30% relative humidity can be cooled to about 80 degrees F for a temperature drop of 20 degrees. Fan and pad systems can be used in areas with high humidities because humidity levels tend to be lowest during the warmest part of the day.

To gain maximum benefit from this system, the material used to provide surface area from which the water evaporates should be properly maintained and properly wet at all times. Fans that provide air movement for evaporation should also be moving the correct volume of air.

Table 1. Maximum temperature reduction using evaporative cooling.

	Relative Humidity — Percent			
Temperature, F	*30*	*50*	*70*	*80*
	---------- degrees ----------			
110	38	22	10	7
105	27	18	10	7
100	25	17	9	6
95	24	16	9	6
90	23	15	8	6
85	21	14	8	5

Another type of evaporative cooler is the "fogging" system. It uses high pressure to create a very fine mist inside the house. Studies show fogging to be about 50% as efficient as the fan and pad system. Fogging should not be considered unless the fan capacity is at least six cfm per bird and caution should be used to prevent the litter from becoming too damp.

Management

Whitewashing the roof has proved effective in reducing radiant heat buildup in some situations, particularly in houses with little or no roof insulation. A mixture of 20 pounds of hydrated lime, five gallons of water and one quarter polyvinyl acetate makes an effective whitewash. The whitewash is inexpensive and effective, but has a short life-span.

Another way to reduce radiant heat buildup is to sprinkle the roof. Sprinkling can be accomplished by using a sprinkler hose or by dripping water through holes made in other types of hoses or plastic pipe. The volume of water used should be just enough to wet the roof surface without wasting water at the eaves. The sprinkling interval should be determined for each building but will likely need to be at 20-30 minutes.

The capacity of the water supply is important when considering this type of equipment because drinking water must not be jeopardized to supply water for the roof. Since other measures are more effective in cooling houses, roof sprinkling and whitewashing should only be considered as stop-gap measures to get through an extremely critical period and not be used as a regular management procedure.

In laying houses that use shallow pits for manure collection, the cleaning schedule should be stepped up to prevent manure from building up and restricting air flow. More frequent cleaning will also be beneficial from the fly control standpoint.

Feeding and Watering

Adequate water for all birds is essential during periods of hot weather. Increasing the watering space for floor birds by adding more waterers and by locating them in areas where water is not usually found can encourage increased water consumption.

In houses with flow-through watering systems the number of times the water is on and the amount of water should both be increased. The last birds in the row should have water for at least 8-10 minutes during each watering period. If water in the watering system gets hot during the day it may be advantageous to flush the system several times. The birds will not drink warm water as readily as cool.

Feed consumption can also be a matter of concern during hot weather. Consumption rates usually go down and birds may not be ingesting enough of the proper nutrients to maintain growth or production at the desired level. Adjusting the feed formulation to take into account reduced consumption may be necessary.

Some broiler producers have found that feed withdrawal during the hot part of the day can also help reduce mortality. This technique requires some guesswork because of the need to stop feeding if house temperatures exceed 90 degrees F. during the day. Feed should be withdrawn by turning off the feeders or lifting them up early enough for the digestive tract to be empty before the house temperature reaches the critical 90 degree mark. Raising the feeders has the advantage of immediate feed removal as compared to some feed remaining in the feed pans if the feeders are turned off. The birds should not be fed again until after the temperature has dropped below 90 degrees in the evening. Feed withdrawal should not be used as a routine practice or growth rates will be reduced. It should be used only in emergency situations.

Maintaining bird comfort during periods of extremely hot weather is essential in all types of poultry operations. Through the use of proper ventilation, good bird and house management, and proper feeding and watering programs, the stress and mortality due to high temperatures can be minimized.

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