The University of Georgia
Cooperative Extension Service
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Poultry Housing Tips

Environmental Management and Disease Prevention

Volume 11 Number 9 **October, 1999**

The old saying "*an ounce of prevention is worth a pound of cure*" is very appropriate when it comes to respiratory disease in poultry houses. It is generally accepted that if a grower maintains the proper house temperature and air quality the likelihood of problems with respiratory disease will be lowered. Even if a grower ends up with a respiratory disease challenge, the severity can be lessened through proper environmental management.

When we are talking about proper environmental management we are really talking about control. If a grower can control his air temperature and air quality, he will have some element of control over respiratory disease. But, without adequate environmental control a grower becomes powerless when it comes to fighting respiratory disease. Simply put, a grower who can increase ventilation rates, thus providing better air quality for the birds without sacrificing house temperature or causing drafty conditions, will typically fair better than a grower who cannot.

Most natural or curtain-ventilated houses provide the grower with very limited control over both air temperature and quality. This is because the typical naturally-ventilated house offers very little control over both how much fresh air enters a house as well as how it moves once it is in the house. For instance, the amount of air that can enter a house through a small curtain opening can vary dramatically from moment to moment as wind speed and direction changes. These dramatic changes in the amount of fresh air that enters a house can result in large variations in air temperature and quality. So a grower can have good air quality with low house temperatures one moment, and poor air quality and relatively high air temperatures the next. The widely fluctuating environmental conditions can stress the birds making them more susceptible to respiratory and other disease.

Making matters worse, during colder weather when most growers have the biggest problems with respiratory disease, the cold, dense air that enters through cracked curtains or windows tends to rapidly fall to the floor, displacing warm air near the floor causing bird chilling. Often this phenomena is not recognized by the grower because he will likely be wearing boots and long pants preventing him from sensing the air temperature at floor level. Furthermore, since cold air has very little moisture holding ability the fresh air entering the house does not remove an adequate amount of moisture from the litter leading to litter caking and the formation of ammonia which can inflame respiratory passages increasing the likelihood of disease.

To maximize a grower's control over both air temperature and exchange, exhaust fans and adjustable air inlets are required. The exhaust fans allow a grower to precisely control the amount of fresh air that enters the house while the adjustable air inlets gives him the ability to direct the incoming fresh air toward the ceiling. As the cold air moves along the ceiling it mixes with the hot air that tends to collect at the ceiling. This raises the temperature of the incoming air before it moves to the floor and minimizes the likelihood of drafts and bird chilling. After the fresh air mixes with the warm air near the ceiling, it slowly drifts down to and across the floor, removing moisture from the litter and thus limiting litter caking.

Regardless of the style of housing, the first step in minimizing respiratory disease through proper environmental management is to evaluate how good of a job your ventilation system is presently doing. A few thermometers scattered around a house will not provide an accurate picture of the environmental conditions within a poultry house. They do not inform a grower as to what is happening in a house at 3:00 AM, nor do they give any indication of air quality. A high/low thermometer is a slight improvement over a conventional thermometer, but even these do not let a grower know when the high and/or low temperatures occurred or for how long, and again they tell a grower nothing about air quality. What is required to truly evaluate environmental conditions in poultry house is a recorder that monitors both air temperature and air quality from minute to minute, 24 hours a day, seven days a week

Due to recent innovations in sensor technology a grower can today purchase a recorder that will do this very thing for less than $175. The miniature temperature/relative humidity recorders can read and store thousands of measurements. Samples can be taken every few seconds up to every few hours. After sampling is completed, the recorders are connected to a computer to download the information so it can be properly analyzed.

Though it would be advantageous to measure other air quality variables such as ammonia and carbon dioxide, these types of meters tend to be very expensive (well over $1,000) and require frequent calibration. Besides this, in most instances monitoring relative humidity is all a grower needs to evaluate how well his ventilation system is operating because ammonia and humidity tend to vary in the same way. For instance, when a grower is not ventilating enough, ammonia, carbon dioxide, and relative humidity will all be high. Conversely when ventilating properly, ammonia, carbon dioxide and relative humidity will be relatively low. Very rarely will a grower run into a situation where there will low relative humidity and high ammonia and carbon dioxide in his houses.

In general, if the relative humidity in a house is between 50 to 70%, air quality tends to be acceptable. If the relative humidity is below 50%, the house will tend to be dusty which can aggravate respiratory passages. A relative humidity in the seventies tends to indicate that air quality is probably less than optimal. If the relative humidity in a house exceeds 80%, air quality is probably very poor, and therefore likelihood of respiratory problems will be increased.

To get an accurate picture of how a ventilation system is operating, temperature and relative humidity recorders need to be placed on or near the floor as well as next to the ceiling. The floor temperature/relative humidity recorder should be placed near a feeder line, a couple of inches above the litter. A 1' X 1' X 1' box made of a relatively large mesh screen must be placed over the box to keep birds away from the recorder. The box should be weighted so that the birds cannot knock it over and should be constructed in such a manner that birds cannot sit on the top of it. The ceiling recorder should be placed a few inches from the ceiling in the center of the house.

Ideally, the recorders should be programmed to record house conditions at least four times a minute. This may seem excessive, but it is necessary in order to determine how a ventilation system is operating. For instance, it is important to know what is happening to air temperature and air quality in the house when minimum ventilation fans come on or shut off for relatively long periods of time, or what is happening in a house using natural ventilation when wind speed or direction changes suddenly. When it comes to looking at how the environment within a poultry house changes over of the life of a flock, a longer sampling rate of once every five minutes will usually suffice.

A temperature/relative humidity recorder placed at floor level will enable a grower to discover exactly what kind of environment the birds are experiencing. For instance, placing a recorder a few feet above the floor would likely fail to identify the existence of cold drafts that move along the floor. With older birds during warmer weather, a recorder placed at floor level can indicate a build up of heat and moist air between the birds which can occur when cooling systems are not operating properly. Furthermore, when dealing with young chicks it is crucial to know litter temperature and how it changes throughout a day.

A recorder placed near the ceiling will indicate if a grower is doing a good job of moving the warm air off the ceiling of his house down to bird level during cool weather. If every time a minimum ventilation fan comes on air temperature at the floor drops but the air temperature at the ceiling does not, it indicates that the cool air entering the house is

dropping to the floor before it mixes with the hot air near the ceiling. But, if ceiling temperature decreases when the minimum ventilation fans comes on and the floor temperature remains relatively stable, the grower is achieving proper air mixing and his birds are not being exposed to harmful drafts (Figure 1).

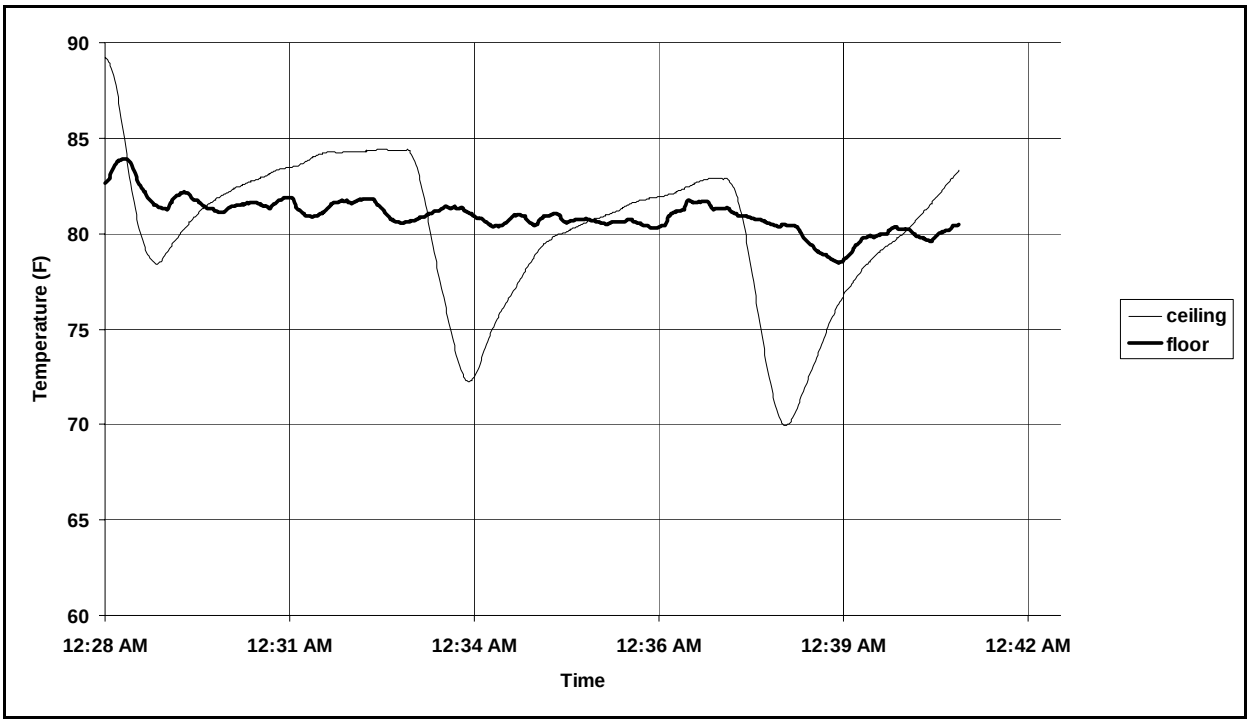

Figure 1. Floor and Ceiling Air Temperatures in a Properly Ventilated Poultry House

It is important to keep in mind when examining temperature/relative humidity graphs that the key to minimizing bird stress and therefore respiratory disease, is consistency. If large variations in house temperature and air quality are noted using temperature/relative humidity recorders, it is important for the grower to look into ways of minimizing these variations. In naturally-ventilated houses it could be as simple as installing mixing fans to move the warm air near the ceiling down to bird level or as complex as installing exhaust fans and adjustable air inlets. In houses with exhaust fans and air inlets, cracks may need to be sealed, adjustments made to inlet openings or minimum ventilation fan settings may need to be changed. After changes are made to the design or management of a house's ventilation system, temperature and relative humidity can then again be monitored to see what progress has been made. Over time with some experimentation and monitoring, a grower should be able to progress towards a more consistent, quality environment, thus reducing respiratory disease related problems.

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Provided to you by:

This newsletters is a reprint of an article written by the authors which appeared in World Poultry magazine

Publication of this newsletter is supported by funds granted to the DOE pursuant to the provisions of public law 94-163