The University of Georgia
Cooperative Extension Service
College of Agricultural and Environmental Science/Athens, Georgia 30602-4356

Poultry Housing Tips

Benefits of Controlling Relative Humidity

Volume 9 Number 4 **March, 1997**

For years many producers have used ammonia levels as the primary basis for determining timer fan settings. For example, a grower may set his interval timer for 30 seconds or maybe even a minute out of ten with day old birds when there is little or no ammonia. As the birds get older and ammonia increases, the timer clock setting and the number of fans operating off the timer are increased to keep the ammonia levels at what the grower perceives as acceptable. Though this method of setting timer fans has proven fairly effective in the past, is their a more effective air quality variable that could be used to help determine how to set timers on minimum ventilation fans? After all, what is perceived as a high level of ammonia varies from grower to grower. Furthermore, growers often become desensitized to ammonia over years of working in a poultry house, limiting their ability to determine when ammonia levels are high. Instruments used to measure ammonia are of little practical use due to their cost, questionable accuracy, and high level of maintenance required.

As discussed in previous newsletters, setting timer fans according to relative humidity can help to keep ammonia levels under control because you are keeping one of the key building blocks in the formation of ammonia at a minimum, namely water. And unlike measuring ammonia, measuring relative humidity is very inexpensive and easy to do. In addition to helping control ammonia, limiting relative humidity offers some other advantages that controlling by ammonia does not.

A study conducted by Weaver and Meuerhof in the Netherlands found a number of advantages of controlling house humidity. In one part of the study, one group of birds was raised to 42 days of age at a relative humidity of 45% and another at 75%. They found that ammonia levels were significantly lower in the pens where a relative humidity of 45% was maintained. The lower ammonia levels were the result of the fact that litter moisture was 30 percent lower and level of caking was over 20 percent lower in the 45% relative humidity group. Because the nitrogen from the manure was not being used to form ammonia there was approximately 10% more nitrogen in the litter, thereby increasing its fertilizer value.

The biggest difference noted in the study was in the incidence of ammonia burns. The incidence of ammonia burns was approximately three times higher in the pens where the relative humidity was maintained at 75%, and the severity of the burns was significantly higher. The incidence and severity of swollen, calloused foot pads was significantly higher for the 75% relative humidity than for the 45% relative humidity pens. Approximately 54% of the broilers grown under high relative humidity experienced at least some foot pad abnormalities, whereas under low humidity less than 14% had lesions. Weaver and Meuerhof confirmed the findings of a previous study on relative humidity and bird performance that there was a slight weight advantage by growing birds in a drier environment.

Though maintaining a constant relative humidity of 45% would be very difficult in an actual poultry house due to the influence of outside conditions, ie. rainy days, the point is an effort should be made to try to obtain lower

humidity rather than a higher relative humidity. By monitoring relative humidity and adjusting timers accordingly, many of the above benefits can be obtained by maintaining an average relative humidity of 50 or 60 percent as opposed to 70 or 80 percent.

It is important to note that on rainy days producers should not decrease timer fan settings in an effort to "bring in less moisture". The moisture is in the house not outside the house. Rule of thumb, every time you increase the temperature of the air by 20°F, the moisture holding ability of that air doubles. Bringing air in through adjustable air inlets and directing it along the ceiling to mix with the warm air that accumulates there dries air out. This is because the moisture holding ability of air increases as you raise its temperature. For instance, if it is 50°F outside and 100% humidity and you bring that 50°F air in through your inlets, direct that cool air along the ceiling and heat it up 20°F to 70°F, the moisture holding ability of the incoming air will double, and therefore the relative humidity of the incoming air will decrease to 50%. Measurements confirming this scenario made in an actual poultry house can be seen in the November 1990, *Poultry Housing Tips* newsletter entitled "Ventilating Poultry Houses on Cold, Rainy Days".

Just keeping relative humidity in check does not mean that you will not have ammonia. As long as there is manure, water, and heat in a poultry house there will be ammonia. As a result, even though the relative humidity may be in check you still may have to increase your timer fan settings to keep ammonia levels within acceptable levels. However, by limiting the amount of moisture through proper ventilation you can significantly minimize the formation of ammonia.

Some consideration has been given to attempting to control your minimum ventilation fans with a humidistat. Unfortunately this not practical at present. There are days when the humidity in the house will be on the high side due to outside conditions. For instance, if it is raining outside obtaining an inside relative humidity of 50% would be very hard to do. A humidistat would likely operate the fans constantly to try to keep humidity levels down resulting in excessive fuel usage.

Michael Czarick
Extension Engineer
(706) 542-3086
(706) 542-1886 (FAX)
mczarick@engr.uga.edu

Michael P. Lacy
Extension Poultry Scientist

Provided to you by:

Weaver, W.D. and R. Meuerhof. 1991. The effect of different levels of relative humidity and air movement on litter conditions, ammonia levels, growth and carcass quality for broiler chickens. Poultry Science 70: 746-755

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