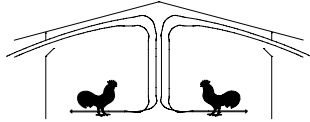




The University of Georgia
Cooperative Extension Service

College of Agricultural and Environmental Science/Athens, Georgia 30602-4356



Poultry Housing Tips

Measuring Ammonia Levels in Poultry Houses

Volume 14 Number 8

October, 2002

It is a well established fact that in order to maximize broiler performance it is crucial that ammonia levels are kept to a minimum during the growout. Numerous studies have shown that ammonia concentrations over 30 ppm reduce weight gains, increase feed conversions, decrease bird uniformity and yield as well as increase susceptibility to disease. The problem is that many broiler producers have difficulty in smelling the difference between 20 and 40 ppm so they might have harmful levels of ammonia in their houses and not even be aware of it.

There are a number of tools available to producers that can help them determine ammonia levels in their houses. Though some cost thousands of dollars and require frequent calibration, there are a number of low cost, easy to use and relatively accurate options that can be used to determine whether ammonia has reached harmful levels.

Hydrion Ammonia Test Paper:

Hydrion ammonia test paper is the most inexpensive and simplest method of measuring ammonia. A small strip of paper is moistened with distilled water and then exposed to the air in the poultry house for 15 seconds. Chemicals in the paper react to the ammonia in the air which causes the paper to change color. The color of the strip can then be compared to a color chart which comes with the test strips to determine the amount of ammonia in the house.



Though studies conducted in Canada have shown that the test papers are fairly accurate when compared to gas tubes, they do not provide a precise measure of ammonia. The color chart which comes with the test paper illustrates the color change associated with 5, 10, 20, 50 and 100 ppm. Though the color changes associated with 10 ppm or 20 ppm are easily distinguishable, it is much harder to determine the color difference between 20 and 50 ppm. As a result, the ammonia test strips are best suited to determine in general whether ammonia has reached a harmful level, not to determine the precise level of ammonia.

To maximize accuracy of the strips it is important that distilled water is used. Small amounts of chlorine and/or other chemicals can react with the paper, giving a false reading. The color of the paper should be noted no longer than 15 seconds after it is wetted because as the paper dries out the color tends to fade. There may be variations in color over the length of a wetted strip. The most accurate color change tends to occur at the transition between the wetted and dry areas of the paper strip.

PUTTING KNOWLEDGE TO WORK

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES, COLLEGE OF FAMILY AND CONSUMER SCIENCES
WARNELL SCHOOL OF FOREST RESOURCES, COLLEGE OF VETERINARY SCIENCES

The University of Georgia and Fort Valley State University, the U.S. Department of Agriculture and counties of the state cooperating.
The Cooperative Extension Service offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, sex or disability.
An equal opportunity/affirmative action organization committed to a diverse work force

Each roll is 15' long which will provide a grower the ability to take well over 50 measurements. Considering each roll costs about six dollars, the ammonia test strips provide by far the most inexpensive method of providing a grower with a “ball park” measure of ammonia levels.

Approximate Cost: A box of 10 rolls of test paper = \$55.

Source: Cole-Parmer (catalog #00119YP)
www.coleparmer.com

Gas Detection Tubes:

Gas detection tubes are the most commonly used method of measuring ammonia in poultry houses. The ends of a small glass tube are broken off and one end of the tube is placed into the end of a small hand-operated piston pump. The handle on the pump is pulled back and a 100 ml sample of the air in the house is pulled through the glass tube. The ammonia in the air reacts to chemicals in the tube, changing the color of the chemicals the length of the tube from purple to beige. The higher the level of ammonia in the house, the longer the color change down the length of the tube. A graduated scale on the outside allows fairly easy determination of ammonia concentration.



The tubes are available in different ranges 1-30 ppm, 5-100 ppm, and 25 - 500 ppm. The lower range offers very precise measurement in low ammonia situations. The 5-100 ppm range tubes allow for a wider range of ammonia conditions and can be used to determine ammonia concentration to approximately 5 ppm level.



The accuracy of gas detection tubes can vary significantly (+/- 10 to 20%) because of the difficulty involved with determining exactly where along the length of the tube the color changes from purple to beige, sampling procedure errors, as well as environmental factors. If a highly accurate reading is desired multiple samples should be taken.

Though each tube is intended for a single measurement, multiple measurements can be obtained by subtracting the first measurement from the second measurement. It is important that the time between measurements be kept to a minimum because the chemicals within the tube quickly lose their potency after being exposed to air.

Approximate Cost: Hand pump = \$165 - \$300
Box of ten, single-use tubes = \$25 - \$35

Sources: RAE Systems
www.raesystems.com
Matheson Gas Products
www.matheson-trigas.com
A.P. Buck Inc.
www.apbuck.com

Passive Dosimeter Tubes:

Passive dosimeter tubes allow easy long-duration measurement of ammonia in poultry houses. One end of the five-inch glass tube is broken off and the tube is placed in the house for up to 10 hours. Ammonia in the house reacts with the chemicals in the tube resulting in a color change from blue to yellow down the length of the tube. A printed calibration scale on the tube indicates ammonia concentration in terms of ppm hours. The reading is then divided by the number of hours the tube was in the house and time-weighted (average) ammonia concentration can then be determined.



There are a couple of advantages to the passive dosimeter tubes over the traditional gas detection tubes. First, no pump is needed, thereby reducing the cost. Secondly, other ammonia measurement devices only provide the ammonia concentration the instant the measurement is taken, which can change not only from day to night but from minute to minute as timer fans turn on and off. The passive dosimeter tubes provide producers a time-weighted average ammonia concentration which provides a better indicator of what adjustments need to be made to timer fan settings. Like the gas tubes, the accuracy of dosimeter tubes can vary significantly (+/- 10 to 20%) because of the difficulty involved with determining exactly where along the length of the tube the color changes from purple to beige, sampling procedure errors, as well as environmental factors.

Since passive dosimeter tubes are relatively expensive they are best suited for use when the chicks are young and ammonia has the greatest effect on bird health and performance. One use could be placing a tube a few inches above the floor the night before the chicks arrive. In the morning the average ammonia concentration can be determined and adjustments made to timer fan settings. A second tube the next night can insure that the timer fan settings are correct.

Approximate Cost: Box of ten, single use tubes = \$35

Source: A.P. Buck Inc.
www.apbuck.com

Electronic Ammonia Meters:

Most electronic ammonia meters use some type of electrochemical sensor to measure ammonia. Ammonia in the air reacts to the chemicals in the sensor, generating an electrical current proportional to the amount of ammonia in the air. Though electronic ammonia meters can be very accurate, there are a number of problems associated with their use in poultry houses.

Many of the electronic ammonia meters on the market today have accuracy problems when placed continuously in an environment where there is a high concentration of ammonia. Over a period as short as a few days, the accuracy of the units often falls, resulting in a need for calibration. Calibration procedures can be a time consuming and costly task because you have to have a sample gas of known concentration in order to calibrate the unit. Portable units which are only in the house for a short period tend to be less problematic, but these too need frequent calibration and the electrochemical sensors in the meter often have to be replaced every few months. Since most electrochemical ammonia sensors cost hundreds of dollars, keeping a unit operating can be a costly undertaking.




For the time being, electronic ammonia meters are best suited for research studies where the cost and labor involved in keeping them working properly are more easily justified.

Approximate Cost: \$1,000 - \$1,500

Source: Drager
www.skinc.com/gas



Michael Czarick
Extension Engineer
(706) 542-9041 542-1886 (FAX)
mczarick@engr.uga.edu
www.poultryventilation.com



Brian Fairchild
Extension Poultry Scientist
(706) 542-9133
brianf@uga.edu

Provided to you by:
