

# *Poultry Engineering, Economics & Management*

## Newsletter of the National Poultry Technology Center, Auburn University

***Critical Information for Improved Bird Performance Through Better House  
and Ventilation System Design, Operation and Management***

Produced in cooperation with the U.S. Poultry & Egg and Alabama Poultry & Egg Associations  
Issue No 80, January 2014

# The Seven Basics of Better Brooding

*National Poultry Technology Center – Auburn University College of Agriculture*

*By: Jess Campbell, Dennis Brothers, James Donald & Gene Simpson*

We get a lot of questions, and one question always stands out during the winter months: “What is the silver bullet for growing chickens?” The answer is and will always be, “There is no silver bullet.” There are, however, certain basics of poultry husbandry, and the growers and companies that seem to always have the advantage are typically the ones who do the best job of managing those basics during brooding.

Brooding is the “lift-off” phase of chicken development, with the highest percentage of feed going to growth and so producing the most rapid growth rate, giving chicks a good start in life. That good start is extremely important. No failure to achieve optimum growth during brooding can ever be made up later in the growout. Both research and on-farm experience show that even a few hours of poor conditions during brooding can do significant harm to overall flock performance.

Modern poultry houses and management systems give us the ability to control conditions in the house and give chicks the good start they need. All it takes is paying proper attention to the seven brooding basics.

## **Brooding Basic #1: Litter Management**

Litter conditions set the tone for the flock long before the chicks arrive on the farm. For best performance, chicks must be placed on a consistent minimum of 4 inches of dry bedding at or around 88-92°F. Anything less will cause losses in performance proportional to the degree of insufficiency. If chicks are not started on fresh litter, steps must be taken to reduce litter moisture and properly condition the litter to release as much ammonia as possible before flock placement. Allowing the litter to set in a house cold and wet between flocks is a recipe for disaster.



**Paying proper attention to the 7 brooding basics requires making proper use of just 6 basic tools. Five of these, shown below the bucket, left to right, are relatively low-cost instruments that every grower should be familiar with: wind meters, smoke emitters, pressure gauges, air temp and humidity meters, and infrared temperature guns.**

**The bucket represents the sixth and most important tool: you yourself, live and in person, taking the time to sit on a bucket inside each house observing chick behavior and equipment operation.**

**The gadgets are essential for getting accurate readings of particular in-house conditions, but they do not tell the whole story. It's up to you to assess the situation and make the right management decisions to give your chicks the best start possible.**

What to do: Remove caked litter ASAP after the birds leave. After this; windrowing, using litter conditioning equipment, heating the litter with attic inlets and ventilating between flocks can all help achieve the goal of dry litter with reduced ammonia at day one. Top dressing the brooding chamber and applying a company approved, ammonia controlling litter amendment at the manufacturer's suggested rate and method is also highly recommended.

The goal of litter management is first of all to provide comfortable bedding conditions for the chicks; but also to reduce the effect that litter moisture and ammonia have on the environmental control systems. If we have to manage heating and ventilation to compensate for poor litter conditions, it will be much more difficult – and costly – to provide the optimum growing environment chicks need. Think about it: litter condition sets the tone for air quality, heating and ventilation through the life of the flock. Good litter sets the stage for success.

## **Brooding Basic #2: Temperature**

Temperature differences as small as 0.5-1.0 degrees F can impact overall chick health, behavior and growth. Electronic controller technology has given us the ability to monitor and manage temperature that precisely, and do this automatically on a real-time, 24 hour basis. This gives growers a huge management advantage over traditional manual thermostat control. Even so, the old computer adage “garbage in = garbage out” applies to controllers also. A controller's management capabilities are only as good as the information from the sensors it uses. Therefore we must pay close attention to sensor placement! If the ideal starting temperature is 90°F, this means 90°F at the feed and water lines, as consistent as possible. Proper placement depends on the type of heating system and spacing of inlet vents in the house. Proper “ideal” temperatures can also vary according to individual flock requirements. A good manager always monitors his chicks and makes appropriate adjustments.

However, don't expect temperature adjustments to fix every problem every time. Temperature is the most commonly monitored and controlled condition in poultry houses, but the other brooding basics can be just as important to flock performance.

## **Brooding Basic #3: Air Quality**

Excess ammonia or carbon dioxide, along with too high or too low relative humidity, can become serious problems, especially during winter flocks. The only way to solve or reduce air quality problems once they have occurred is to increase the ventilation rate. But ventilation decisions should be based on accurate assessment of conditions, and too neither controller systems nor growers are equipped to accurately monitor air quality factors.

For relative humidity monitoring, inexpensive sensors can be purchased from local hardware stores and placed near mid-house away from heaters and air inlets. Oftentimes controllers can be fit with humidity sensors as well. Either way, the goal is to maintain in-house relative humidity at 50-65% during brooding as long as possible. If relative humidity is below 50%, deduct 15 seconds from minimum ventilation run time. If it is above 65%, add 15 seconds of run time. Early morning is an excellent time to judge air quality conditions and make ventilation adjustments, if needed. If unsure, adjust one house and compare the next day.

Too-high ammonia (NH<sub>3</sub>) or carbon dioxide (CO<sub>2</sub>) levels can impact bird health and growth and can be challenging to control in winter, but are more difficult for a grower to accurately measure. Because growers become accustomed to smelling ammonia, the “nose test” cannot be relied on. Birds can suffer and even be blinded before the grower becomes aware of a serious problem. Carbon dioxide is odorless, and it takes a while for humans to experience symptoms – headaches, nausea and sleepiness – of excess CO<sub>2</sub> levels. Therefore, growers typically must make judgments about these factors based on observation of birds and bird behavior.

If accurate monitoring equipment is available, ammonia levels should be kept below 25 ppm. A minimum of 15 seconds of additional minimum ventilation run time should be added to houses testing above 25 ppm and an additional 30 seconds for over 100 ppm. CO<sub>2</sub> levels should be kept below 3,000 ppm. Too-high CO<sub>2</sub> levels are usually highest when preheating and brooding chicks in tight houses during cold weather when heating systems are running constantly and ventilation run time is lowest.

Fortunately, most ammonia and carbon dioxide problems can be minimized by proper litter management (including use of ammonia-suppressing amendments) and adequate minimum ventilation (including control of relative humidity).

## **Brooding Basic #4: Ventilation**

Good environmental control during brooding requires properly executing the minimum ventilation basics:

1. Pressure. A good rule of thumb for pressure is for every 0.01 inches of static pressure measured in water column, air travels about 2 feet. To get the air to the middle of the house near the ceiling requires about 0.10

inches of pressure in a 40 foot wide house. This means we have to have a house that can pull 0.15 inches or more during a house tightness test with fan power of 1 cfm per square foot of floor space.

2. Inlet Door Opening. The required air pressure capability must be combined with the proper perimeter inlet door opening to throw the air to the center of the house. Too little or too wide of an opening will result in outside air blowing directly onto the feed and water lines and, more importantly, onto the chicks. Step one of vent management should be to manually latch closed all or most of the vents not located in the brood area of the house, after which additional vents inside the brood area may need to be latched closed to achieve the proper air flow with the desired fan power (typically 1.0 -1.5 cfm per square foot). Bottom line is you have to get the correct inlet door opening and static pressure to achieve the desired air throw and mixing. Latching doors or opening doors can be used as a method of fine tuning your perimeter inlet set up. A smoke emitter of some type will show exactly where the air is going. Do whatever it takes to get the air to the peak of the ceiling to promote good mixing. The importance of adjusting vent door openings properly to achieve good moisture removal cannot be over- emphasized.

3. Fan Run Time. Finally, it is essential to calculate the correct amount of minimum ventilation fan run time. We offer a handy electronic calculator on the poultryhouse.com website that anyone can use (no computer training required). You only have to know the basic numbers for your house fan capacity and the number of chicks you are brooding, along with the per-chick run-time you want (and there are even suggestions for deciding what that number should be). Click the *Minimum Ventilation Run-Time Calculator* link at the top of the poultryhouse.com homepage. There is a separate link to a calculator designed for smart phones.

## **Brooding Basic #5: Water Quality and Availability**

Having high-quality water freely available can make a huge difference in getting chicks off to a good start. One of the first things a grower should do if he is experiencing consistent performance problems is have a water sample analysis conducted. Contact your company or local County Extension Office for help with water sampling and analysis. If substantial water quality problems are found, a consultation with a respected water quality expert is in order.

Water quantity problems can be difficult to diagnose; however, a common sense approach to making sure chicks have plenty of water available is to do a good job of routine drinker system maintenance. The importance of getting water into the chick as soon as possible cannot be overstated. This means that cleaning water systems and activating nipple drinkers before every flock arrives is extremely important. Also pay close attention to initial drinker height and make adjustments that reflect bird growth on a routine basis. Chicks will consume a lot less water than older birds so flushing drinker lines often in the beginning will keep the water fresh and promote greater consumption. Water filters, regulators, and any possible water restriction points must be monitored before and during each flock. Don't assume water quality and availability are adequate, verify it.



**Offering chicks easy and early access to quality feed and water cannot be over emphasized. Feeder lines and drinkers must be maintained and kept working properly.**

**Also realize that if chicks have to make a decision between comfort and feed and water, they will often chose comfort. That means it is essential to make sure conditions at chick level around feeders and drinkers are good: no cold spots or drafts, no wet litter, etc.**

## Brooding Basic #6: Feed Availability

Feed availability runs hand in hand with water availability and is of equal importance. The quicker chicks have access to and consume quality feed, the better start they will have. The actual amount an individual chick consumes on day one through seven is very small, so the tonnage of feed in the house on day one is not nearly as important as providing access for every chick to easily get to feed. Another way to say this is that feeding space/opportunity is most important. Chicks having sufficient access to feed is more than just feeder pan, chick tray and supplemental feed lid management. Environmental factors also play a huge role in feed availability because if a chick isn't comfortable (too hot, cold or drafty) near the feed trays or lines, it will not eat or drink sufficiently. This can be a severe problem that must be corrected. Many companies look for about 95% of the chicks with feed and water in their crops after 24 hours. Remember, if a chick is given the choice between comfort and feed or water, it will choose comfort. Make sure every chick gets feed and water quickly and easily.

## Brooding Basic #7: Lighting

Chicks grow, gain, and perform better the quicker they gain access to feed and water, and light stimulation further encourages feed and water consumption. Specific lighting programs are under constant revision and vary from one integrator to another. However, the most common recommendation for light intensity when lighting is on calls for a minimum average light intensity of 3 or more foot-candles for the first 7-10 days, measured along the feed lines between grow lights. Large shadows, blown bulbs and insufficient lighting intensity and uniformity are problems that can be identified and corrected with the use of a simple \$150-\$200 digital light meter. Don't assume your light intensity is adequate, verify it. Buy a meter and calibrate the dimmer in each house. Many growers are surprised at how far off their settings are after they measure them with a meter.

## The Bottom Line

Each of these brooding basics has evolved and improved into what the industry considers standard procedures for brooding chicks today. Using the tools and equipment available to follow these basic procedures is not just the best but the only way to give your chicks the "lift-off" they need to become a top-performing flock. Growing chickens today is not a matter of managing by the day, but by the hour. Mistakes made in the first 72 hours can't be made up later in the flock. Taking the time to do brooding right pays off at catch time.

*NOTE: This article should be considered a basic guide for getting chickens off to a good start. Individual integrator recommendations may vary from these guidelines due to location, type of bird grown, type of heating system, ventilation set up, type of house and other factors. Follow your integrator guidelines.*



U.S. Poultry & Egg  
ASSOCIATION



Thanks to the following for their support of Extension poultry engineering, economics and management programs at Auburn University:

### Diamond

Aerotech/Munters..... 888-335-0100  
Agrifan..... 800-236-7080  
Cumberland ..... 217-226-4401  
Hired Hand, Inc. .... 800-642-0123  
Port-A-Cool ..... 800-231-9940  
Porter Insulation Products..... 800-999-0430  
Poultry Litter Treatment-PLT..... 800-379-2243  
Reeves Supply..... 888-854-5221

### Platinum

DIVERSIFIED / ROTEM ..... 800-348-6663  
Pro-Tech, Inc..... www.pro-techinc.com  
Tabor Group Inc./aglights.com ..... 540-989-7383

### Gold

Chore-Time ..... 574-658-4101  
J&R Builders/Farm Systems ..... 205-594-5994  
Multifan/Vostermans  
Ventilation, Inc..... 800-458-5532

### Silver

Alabama Farm Credit..... 877-681-6087  
Aviagen ..... 800-826-9685  
CoolAir ..... 904-389-1469  
Dandy/G&M Sales ..... 800-222-4166  
Detroit Radiant Products Co. .... 800-222-1100  
Double L Group..... 800-553-4102  
Ellison and Ellison ..... 770-427-8929  
First South Farm Credit..... 800-955-1722  
IVESCO ..... 800-643-3064  
Lewis Brothers ..... 912-367-4651  
Space Ray ..... 800-438-4936  
VALCO ..... www.val-co.com



The Poultry Engineering, Economics and Management Newsletter provides up-to-date information on topics of interest to poultry production personnel, focusing on most effective and efficient uses of modern technology and equipment, with a special emphasis on economic implications. The Newsletter is published six times a year, or as needed to address emerging or special issues. Contact: Jess Campbell, National Poultry Technology Center, 226 Corley Bldg., Auburn University, AL 36849-5626, (334) 844-3546, fax (334) 844-3548, jesscamp@aces.edu. Published by:

  
Jess Campbell, Poultry Housing Specialist,  
National Poultry Technology Center

  
Dennis Brothers, Poultry Housing Specialist,  
National Poultry Technology Center

  
Jim Donald, Professor and  
Extension Engineer

  
Gene Simpson, Professor and  
Extension Economist

Issued in furtherance of Cooperative Extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, and other related acts, in cooperation with the U.S. Department of Agriculture. The Alabama Cooperative Extension System (Alabama A&M University and Auburn University) offers educational programs, materials, and equal opportunity employment to all people without regard to race, color, national origin, religion, sex, age, veteran status or disability.