

# *The Poultry Engineering, Economics & Management* **NEWSLETTER**

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

Auburn University, in cooperation with the U.S. Poultry & Egg Association

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## **Feature article**

# Why Controllers?

In 1950 it took 60 days to produce a four-pound broiler chicken. The birds of the Fifties were very hardy. They could be raised in simple, basically open-sided sheds and were able to handle extreme heat and extreme cold. As the poultry industry expanded, however, poultry scientists improved the performance of commercial broilers dramatically. Today we can easily achieve a four-pound bird in 35 days, with more white meat and better feed efficiency.

**The catch: We can only achieve the modern bird's performance potential if bird nutrition is correct and the bird environment is managed much more closely than in the old days.**

Modern birds simply cannot tolerate temperature swings that might have been acceptable just twenty years ago. Even aside from the issue of mortalities, the range of temperatures within which we get maximum bird performance has become much narrower. Air quality factors, relative humidity and lighting have become more and more important. Today's bird is more complex, less hardy, and much more demanding from an environmental standpoint. And we are placing more and more birds in larger houses that cannot be successfully ventilated simply by opening sidewall curtains.

**Thermostats were the solution – for a while.**

In the early days of closed-house environmental control, mechanical thermostats were adopted as the best means to turn equipment on and off in response to in-house temperature changes. Thermostat-equipped houses with tunnel ventilation and negative-pressure power ventilation provided much better growing conditions than older houses using curtain ventilation and stirring fans.

**However:**

- Thermostats are not very accurate or reliable, and need to be reset regularly as a growout progresses and conditions change.
- Even in the best thermostat-operated houses, temperature monitoring typically shows large swings in temperature and air quality.
- Management of thermostat-controlled houses is severely challenging. Very close management is needed. And the manager must be an intelligent, well-trained and experienced person who is capable of correctly determining and diagnosing in-house conditions. He must consistently make the right heating, ventilating, and cooling decisions.

**Growers increasingly found themselves in a predicament.**

The modern broiler house may have curtain sidewalls, but more and more they are used primarily or only as emergency backups. The environment needed by the birds must be provided by coordinated heating, ventilating and cooling systems. That means they require very close management. At the same time, it has become increasingly necessary for growers to operate multiple poultry houses to be cost effective. But an individual grower simply cannot be in all the needed places at all the right times. Providing the kind of management needed under these circumstances for the now-common four-house poultry farm on a 24-hour, 7-day basis has proven to be well-nigh impossible, from both cost and personnel perspectives.

**Proven industrial technology to the rescue:** (turn the page, pls)

Fortunately for the grower, two developments in industrial technology over the last twenty years are now available at reasonable costs:

1. Much more accurate and reliable electronic temperature sensors (“thermistors”);
2. Reliable, “smart” electronic control devices.

These two inventions had their start in industrial applications, so they have been well tried and proven. Together, they provide for the grower what amounts to an *electronic management assistant*.

### Is this *electronic management assistant* a computer?

Well, No and Yes –

**NO:** The kind of “smart” control device now being put in chicken houses is NOT a PC/Personal Computer. It is NOT the amazingly capable but finicky, frequently-crashing and buggy PC we have come to (choose one or more): love/hate/fear. It does not do windows, email, word processing, etc.

**YES:** What we call an “integrated electronic controller” has electronic “brain” circuitry similar to that in a PC, but much simpler and more rugged. It is just smart enough to do what we need it to do. Which is what a good human broiler house manager does, as stated above: Correctly determine and diagnose in-house conditions, consistently make the right heating, ventilating, and cooling on-off decisions, and properly coordinate these functions.

The electronic controller generally does the job better than a human manager because it does not sleep or take breaks and can make decisions much faster than a human. Further, by taking care of these environmental control functions, the controller frees up the grower to spend more time on animal husbandry or farm planning and management items which are directly related to profitability.

In addition, the electronic controller can keep and report a history of in-house conditions and its actions.

### A bonus: PC compatibility

PC compatibility is the ability of an in-house controller to be connected by a phone line or direct wiring to a personal computer located at a distance. This kind of connection allows you to see what is happening in your house (or houses) from your office or home PC. It can also allow you to make adjustments in the settings if you see this is needed. (*continued on back page*)

## Thermostat Control vs. Electronic Control

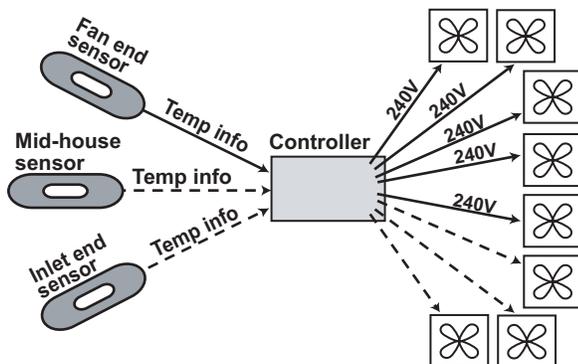
A thermostat is an electrical/mechanical switch that turns a fan (maybe two) on or off. The thermostat operates when air temperature around a bulb or bellows changes.



Each thermostat is hard wired to one (at most two) fans or other equipment. Many thermostats are needed to operate a chicken house, and each one must be set and turned on or off individually. The thermostat setup is very inflexible.

Thermostats can and do drift out of calibration (that is, they change their own settings). This means they are not consistent, and we do not get precisely repeatable results.

Electronic temperature sensors (thermistors) have no moving parts, are very accurate and repeatable, and almost never fail. Electronic sensors do not directly operate switches. They send temperature information to an electronic controller. The controller matches temperature information with its programmed instructions, and operates relay stages to switch on or off various combinations of fans or other equipment.

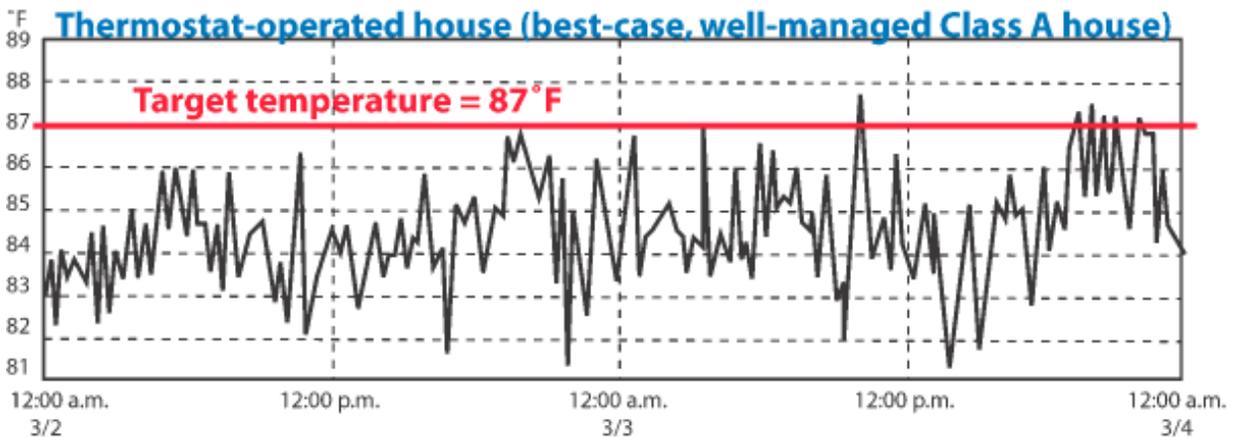
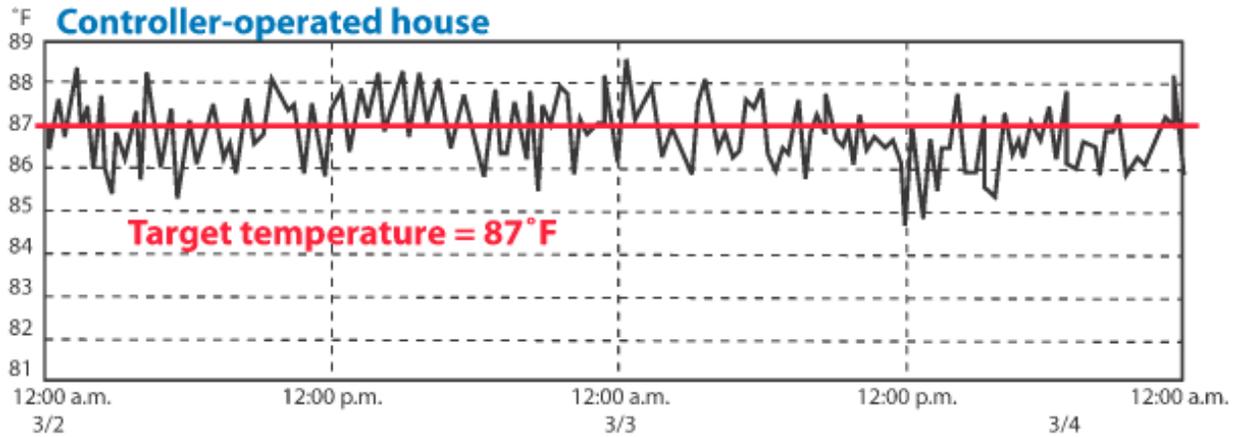


**Example:** All three sensors are sending temperature information to the controller. Temperatures are above target, so controller uses only the fan end sensor (where birds will be warmest) and turns on five tunnel ventilation fans. If temperature info from the fan end sensor goes higher, the controller will turn on more fans.

Controller keeps on monitoring all sensors. If temps drop below target, the controller will switch to power ventilation, using the average temp from all sensors, and selecting the number and type of fans to turn on according to conditions.

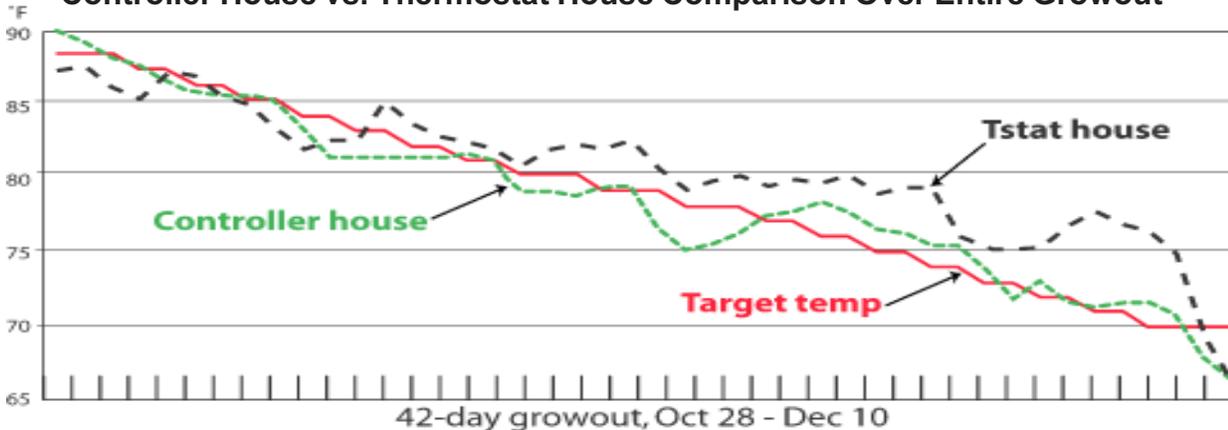
A controller can make adjustments back and forth according to changing conditions, while a thermostat system cannot.

## 48-Hour Comparison of Controller vs Thermostat Broiler Houses



Charts above show actual recorded temperatures in a controller-operated house and a well-managed Class A thermostat house over the same 48 hours on the same farm, starting growouts at the same time. Despite intensive management efforts, the thermostat house did not accurately track target temperature, and had temperature swings of 5-6 degrees. The controller-operated house accurately tracked the target temperature, with temperature swings of only 1-2 degrees. Other things being equal, flock performance in the controller house will be significantly better.

## Controller House vs. Thermostat House Comparison Over Entire Growout



Actual recorded average temperatures over an entire growout of a top-managed Class A thermostat and a controller house on the same farm, with growouts started at the same time. Despite excellent (and time-consuming) management the thermostat house allows consistent over-temperature and is as much as 7 degrees off target. The controller house tracks consistently closer to target, with an average daily deviation from target temp of less than one degree.

Few first-time controller buyers buy a complete PC network at the start. It does cost extra, and it isn't usually required. However, most controller users do ask for the PC connection after they get comfortable with their controller and see how much a remote connection would help ease their management load.

It's a good idea to make sure the controller you are buying is at least compatible with PC networking. Most current controller models are compatible. The day may come eventually when integrators will require PC networking. Sensors can be installed to monitor not only in-house temperatures but feed and water conditions, and even bird weights. Being able to store, analyze and share data such as this through a personal computer can greatly improve trouble-shooting and planning for both a grower and the integrator. Even if you don't choose to install PC networking at the beginning, you can get ready for it without spending much, if any, extra.

**The Bottom Line: Will it pay off to equip my houses with controllers?**

Owning a controller is an investment, and as with all the investments you make in your business, you expect a return. Here are a few ways that a properly set up and run controller can help your bottom line:

- Controllers consistently maintain proper house temperatures within a few degrees of target, avoiding large temperature swings. This maximizes bird growth and improves feed conversion.
- The precision accuracy of a controller can help reduce energy costs by eliminating overheating or over-cooling the house and preventing heaters and cooling fans from running at the same time.
- Controllers make timely and smooth ventilation mode transitions, which helps reduce bird stress, thus lowering bird mortality and condemnations.
- Controllers provide an active alarm system that can help to prevent a catastrophe, and could even lower your insurance premiums.
- A controller can free you from many routine tasks, allowing you to attend to other issues that affect your operating efficiency.

The end results are healthier, less stressed birds that have been grown quicker on less feed with the most efficient use of energy and labor.



U.S. Poultry & Egg ASSOCIATION

**The Poultry Engineering, Economics and Management Newsletter is now being produced in cooperation with the U.S. Poultry & Egg Association, as part of their commitment to poultry industry education. We are proud of this new association, and know it will help to improve our continuing efforts to bring you the critical information you need to know about poultry engineering, economics and management.**

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*Jim Donald*  
Jim Donald, Extension Engineer  
Auburn University

*Mike Eckman*  
Mike Eckman, Extension Poultry Scientist  
Auburn University

*Gene Simpson*  
Gene Simpson, Extension Economist  
Auburn University

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