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Tunnel Ventilating Younger Birds

*By Jim Donald, Jess Campbell, Berry Lott and Gene Simpson**

The summer has been brutally hot in most parts of the poultry belt. Growers with properly designed and maintained tunnel ventilated houses are much better equipped to handle the hot weather. Those with conventional houses can really struggle, especially as the flock nears market age. Tunnel ventilation technology has matured and been used in the US poultry belt for about 25 years. Most growers and managers have a pretty good feel of how to manage tunnel houses as birds get bigger. However, many growers and managers are less sure of how to keep small younger birds comfortable in extremely hot weather. Many of the calls we have been getting lately are from growers asking something like, "If the temperature is at or above 98-100°F outside and birds are only a few days old, what is the best way to get them comfortable in a tunnel house that has 6-inch cool cell pads?"

Tunnel ventilation for very young birds does need to be managed differently from the way we tunnel ventilate older birds. This is why one of the old rules of thumb, "Do not tunnel ventilate birds until they are 21 days old," came into being. This rule of thumb has been around a long time. It came about to keep managers from doing more harm than good with tunnel ventilation on small birds and it came about before we had in place the modern equipment and controls to run a tunnel house. It also came about in an era when the industry was still early on in the learning curve of understanding and managing tunnel ventilation. But experience has taught us that if we understand the basic principles of bird heat transfer when using tunnel ventilation and apply these principles correctly, tunnel can be a very valuable tool to make any age bird comfortable.

One old rule of thumb said, "Do not tunnel ventilate birds until they are 21 days old." But experience has taught us that if we understand the basic principles of bird heat transfer when using tunnel ventilation and apply these principles correctly, tunnel can be a very valuable tool to make any age bird comfortable.

The key point to keep in mind is that just about anything you do to increase air movement or reduce air temperature will have greater effect on young birds than on older birds.

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Tunnel Basics – Applied to Younger vs Older Birds

Whatever the age, any bird that is panting is too warm. Panting is the natural mechanism birds use to rid themselves of excess deep body heat. When a bird gets too warm, it will also cut way back on its eating – because burning more calories makes the problem worse by adding more body heat – and consequently weight gain will suffer. There are lots of other problems that pop up when birds are hot and stay hot. The worst case of course is that extreme heat increases mortalities.

Seeing lots of panting birds is the symptom that tells you the birds are out of their comfort zone and if possible something needs to be done to correct the situation. There are two basic tools that are designed into a tunnel house with cool cells:

1) Putting an airstream directly over the birds to pick up and remove body heat (wind chill); and

2) Lowering the actual temperature of house air.

The house air temperature can often be lowered by just bringing in cooler air from outside. If this is not sufficient or possible (extreme hot weather, outside air temperature higher than inside target temperature) the cool cells are there to lower the incoming air temperature by evaporative cooling. It is really pretty basic.

A good tunnel ventilation management strategy generally is to use air movement and wind chill first, staging on various combinations of fans and air inlets, and turning on cool cells last. Actually the principles of tunnel ventilation for big birds and small birds are the same: Use the tunnel tools to balance the bird heat loss so as to keep the birds in their comfort zone. With big birds the mass to surface area ratio and R value of the bird's surface are dramatically different from small birds that lack feathers or are not yet fully feathered. This is what makes managing tunnel ventilation on smaller birds a more demanding and less forgiving task.

Figure 1 is based on research showing how important wind chill is in keeping birds comfortable and gaining weight. At an air temperature of 85°F, five-pound birds will be suffering from excess body heat in still air and will have to be panting to shed that excess heat (left side of chart). As wind speed increases (toward right side of chart), they are able to shed enough of their body heat through wind chill so that they can resume normal breathing (and eating). For birds at three weeks and older, research shows that the wind chill effect typically does not begin to result in improved weight gain or feed efficiency until wind speed gets over 200 feet per minute.

The response of younger birds to tunnel air is very different. Figure 2 illustrates research showing just how differently younger birds experience wind chill cooling. At an air temperature of 90°F, the effective temperature felt by four-week birds as tunnel wind speed increases will be 3 to 8 degrees lower than the effective temperature experienced by mature birds. The effect is even more pronounced for 1-day to 3-week birds because of their smaller body size and lack of feathers.

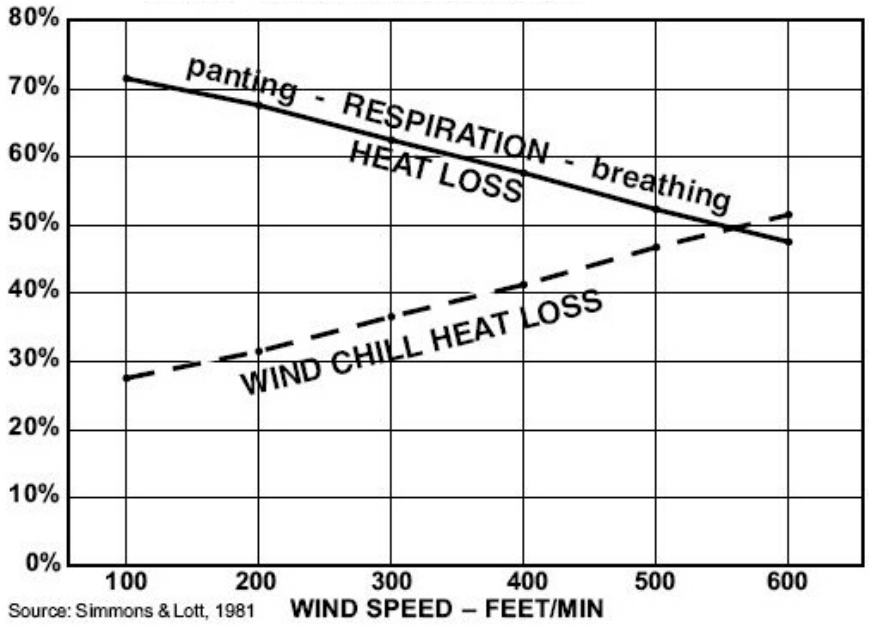
The most important principle to keep in mind in ventilating younger birds is that just about anything you do to increase air movement or reduce air temperature will have greater effect on young birds than on older birds. One-week birds in 98°F air will benefit from some wind chill cooling, but they don't need nearly as much air movement or wind chill as larger birds, and if you overdo it you will chill them, which is as bad as or worse than overheating.

Tunnel Ventilation Strategies for Younger Birds

In managing tunnel ventilated houses (with perimeter vent doors) we always set ventilation programs to start out in the power ventilation vent door mode. As house temperature increases, more fans are turned on in an effort to cool the house off by bringing in outside air. In the vent door mode there is no wind chill cooling placed on the birds and no tunnel effect. If we can get the house near the desired target temperature, the birds will be comfortable. This works well if it is cooler outside than we want it to be inside. But in hot weather, turning on more and more fans does not lower the in-house temperature much and somewhere around 5 to 7 degrees F above target most ventilation controller programs will change the house to the tunnel mode of ventilation. This now puts a direct air stream across the birds and greatly accelerates the heat loss from the birds. If this direct airflow does not sufficiently reduce the deep body bird heat, the last step is to bring on the evaporative cooling (cool cells) and reduce the air temperature.

Most of the time with larger birds after two weeks of age, the controller can handle this with very little grower intervention. Very young birds (day old to two weeks) require a slightly different strategy and closer management.

Figure 1. Heat Loss to Wind Chill vs Respiration at Different Wind Speeds – 5 lb Birds at 85°F



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At an air temperature of 85°F, five-pound birds will be suffering from excess body heat in still air and will have to be panting to shed that excess heat (left side of chart). As wind speed increases (toward right side of chart), they are able to shed enough of their body heat through wind chill so that they can resume normal breathing (and eating).

Figure 2. Wind Chill Effects for 4-Week and 7-Week Birds

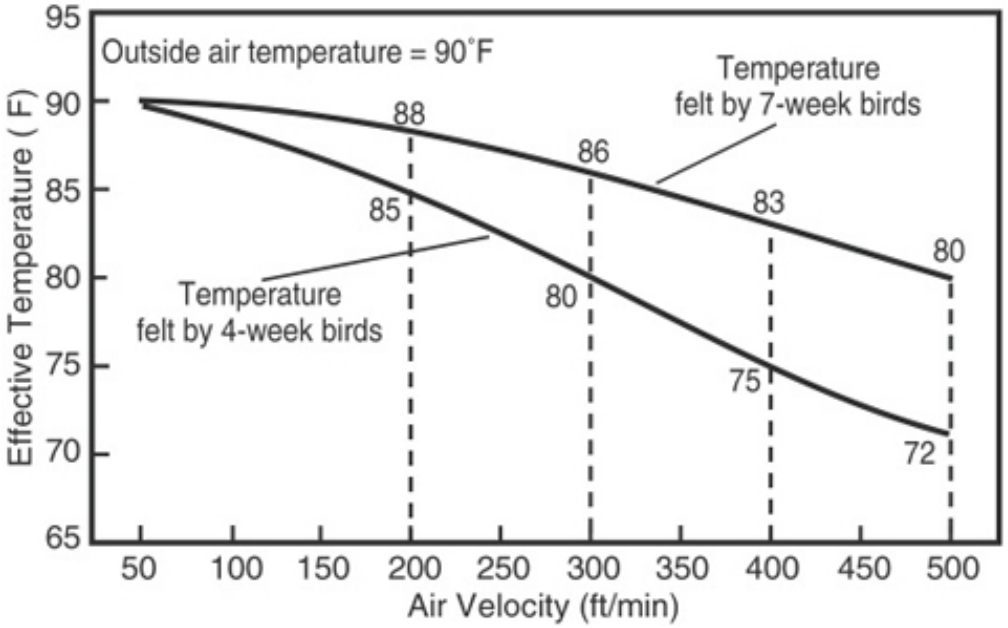

Figure 2 illustrates research showing just how differently younger birds experience wind chill cooling. At an air temperature of 90°F, the effective temperature felt by four-week birds as tunnel wind speed increases will be 3 to 8 degrees lower than the effective temperature experienced by mature birds. The effect is even more pronounced for 1-day to 3-week birds because of their smaller body size and lack of feathers.

First, run vent fans through perimeter inlets (tunnel curtain closed). Tunnel should be the last resort. Try to get the birds comfortable in the vent door ventilation mode. If you cannot get the birds comfortable (still panting) consider tunnel ventilation. With very young birds tunnel needs to be done carefully. You need to be there on the farm to observe the birds. If the birds are hot they can benefit from tunnel but because they are young, very small in mass, and have few feathers, we must tunnel them gently. Two-fan tunnel ventilation with vent doors closed and tunnel inlet opened half way would be a good starting point.

Windspeed with two fan tunnel might be somewhere around 100-120 fpm depending on fan size and other variables. Watch the birds for at least 30 to 45 minutes to see how they react. Adding one more fan for a total of three fan tunnel (150-180 fpm wind speed) might be the next step to try. Adding any more air speed

(more fans) probably will not help much. If the birds continue to be very hot, a good tip is to cut back from 3 fans to two fans and consider putting a small amount of water on the pads. A good practice has been to add water to one side of the cool cells (not both sides) and this water should be limited and not continuous.

Some cool cell systems have been installed so that only the first half of the system can be used. This might be an option on some farms. We like to call it tempering the air. Try to regulate the water to the pad to maintain the desired incoming air temperature. You don't want to see birds sitting down or crowding together, which they will do when they feel chilled. Also, you don't want to let the house get cool enough to yo-yo out of tunnel. Consistent, correct temperature is the key. Find the right combination to get the bird heat balance correct so birds are back in their comfort zone, not too warm and not chilled. As evening approaches and outside air temperature drops, get the house back into the vent door power mode of ventilation.

In determining if you are close to the right temperature heat balance combination for a young flock, it is important to realize is that if you cool it off to the point where there are no birds panting at all, you have probably gone too far for the flock as a whole. At the point where 5-10% of birds are panting or close to panting you are pretty close to the right temperature and heat balance.

One of the old rules of thumb for tunnel management that is still good to know is, "For about 10 degrees F of wind chill cooling turn on the number of tunnel fans equal to bird age in weeks, plus one fan." For example, 2 week old birds need about 3 tunnel fans in tunnel to feel 10 degrees F of wind chill cooling. Four week old birds need 5 fans. Fan sizes have changed so much in the past 10 years that some modifications of this rule might be necessary to fit some farms.

The take-home point on making young small birds comfortable is that you need to observe birds closely and tweak the air flow (ventilation) and if necessary the air temperature (by cool cell) just enough to get the birds comfortable.

The Bottom Line

Birds that are not kept comfortable at the beginning of a growout will not get off to a good start. Flocks that do not start well typically do not finish well. Research has consistently shown that lowered weight gain and feed efficiency in the first weeks cannot be made up in later weeks. Used judiciously, tunnel ventilation and evaporative cooling when needed can help flocks get off to a good start even in extremely hot weather.

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