The Ag forum
by JONES-HAMILTON CO.
The Science of Litter Management®
FALL 2013

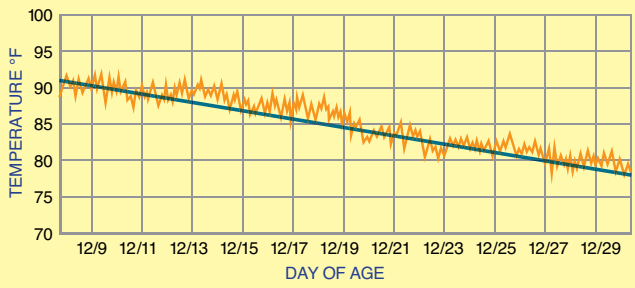
Status of Animal Welfare Initiatives in the Commercial Poultry Industry

Contrary to consumer perception, broiler's welfare status is better than at any time in the history of modern poultry production. The advent of new technology such as solid sidewall, tunnel ventilation and automated housing provides birds with comfortable living conditions. This new technology allows for unprecedented temperature consistency, humidity control and air quality for the betterment of bird welfare.

Temperature Control

The ability to maintain a consistent temperature is likely the most important welfare advantage of modern poultry housing. Current house design and ventilation strategies provide the ideal environment for birds with less than a 5°F temperature variation in a 24-hour period; therefore birds are able to stay in their thermo-neutral zone at all times (Figure 1). This is especially important during the first week of life when birds are not yet thermo-competent and are unable to self-sustain core body temperature. By providing the ideal ambient and floor temperature at all times during the production process, the welfare of birds is greatly enhanced.

Contrast this to the curtain sided houses of the past, where temperature swings of 20˚F were common as fans cycled on and off and birds had difficulty maintaining core body temperature. A significant amount of the increasing efficiency of current production can be attributed to the bird's stasis. Energy is not needlessly expended in achieving ideal body temperatures.



Properly Ventilated House: Only Achieved with Adjustable Inlets
Less than 2˚C temperature & 5% RH variation in 24 hours

Figure 1. Temperature variation through adjustable inlets

Brooding Equipment

Improvements in brooding equipment have also greatly improved bird welfare. Baby chicks maintain body temperature through their feet. Therefore, litter temperature is much more important during the first week than air temperature. The use of radiant brooders has given producers the ability to properly cure litter during the pre-heating process. This assures a uniform floor temperature and allows heat to penetrate deep into the litter core. Another benefit is the ammonia purging, from pre-heating, occurring while the house is empty. In the past, when forced air heaters and pancake brooders were the only available options, a 20-30˚F temperature differential across the floor of the house was not uncommon, meaning that birds had to huddle in feed pans and clump in groups for extended periods of time. This resulted in ascites, higher chick mortality due to starve-outs and dehydration, and slow growth due to low 7-day weights. Today, such conditions are primarily a thing of the past as modern brooding practices provide birds with an ideal environment to thrive, encouraging both bird activity and feed intake from the very beginning.

The ability to sustain appropriate temperatures within the thermo-neutral zone is also evident during the last few weeks of a flock. The improvements in evaporative cooling and the capacity to achieve increased wind speeds, through better tunnel ventilation, allows for the cooling necessary to keep larger birds comfortable at the end of the flock. Cooler temperatures prevent weight loss and undue bird stress resulting from rises in core body temperature. Before the advances of modern solid wall housing, producers were unable to efficiently cool birds in hot weather and heat-related deaths were common. This is just yet another example of how modern day practices and house design enhance animal welfare rather than detract from it.

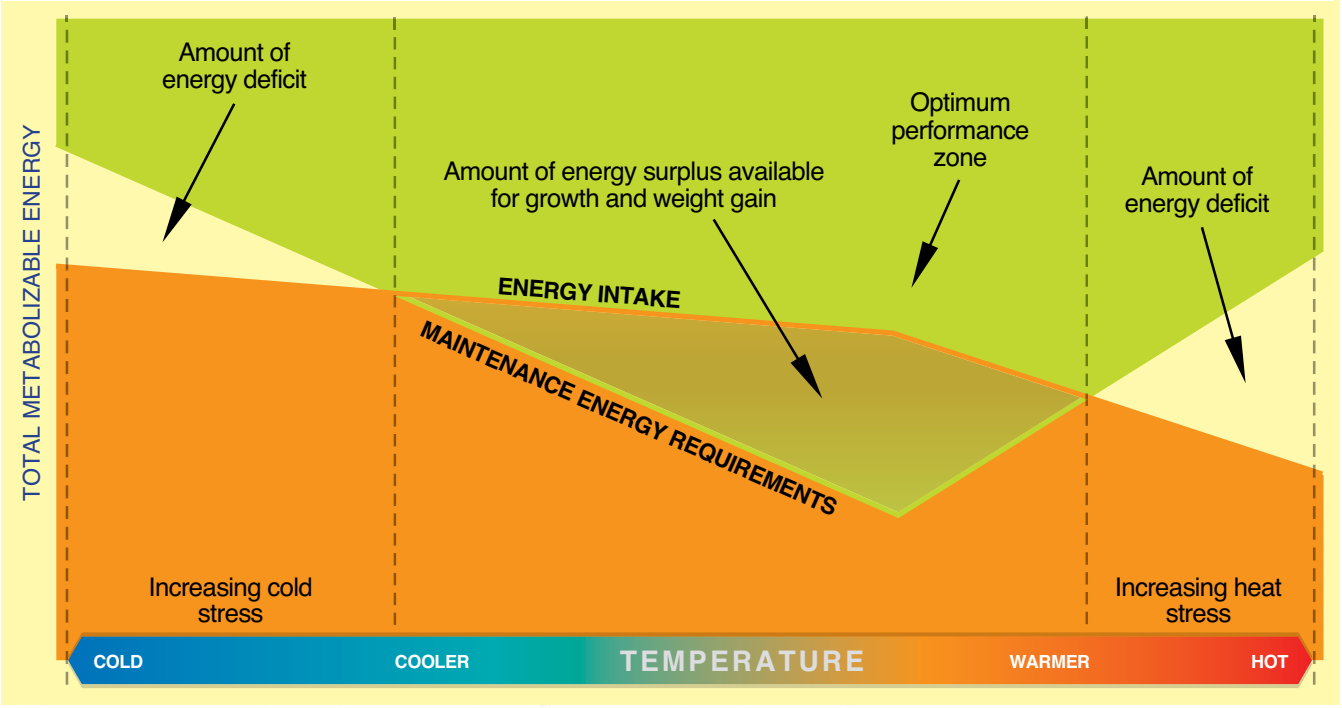


Figure 2. Thermal comfort zone

Humidity Control

Humidity control is also important in achieving better bird welfare. Previously, when birds were raised in curtain sided houses without inlets, humidity control was nearly impossible. Ventilation systems were unable to generate sufficient static pressure to properly control the direction and movement of air into the house. Cold air would enter the house via a curtain crack and promptly fall to the floor, dumping moisture along the way. Subsequently, relative humidity would get quite high at the air-litter interface, causing the litter to get sticky and cake over. This tackiness induced footpad lesions as litter stuck on the bird's feet.

Today, the use of inlet machines and solid sidewall housing allows producers to control airflow direction within a house so that cold air shoots across the ceiling upon entry thereby warming up and drying out before it contacts the litter

(Figure 3). The litter stays dry throughout the entire house, minimizing caking and preventing paw lesions. This directional airflow is also the reason house temperatures can be contained within such a narrow range. Paw lesions are frequently used as an indicator of overcrowding or other animal welfare issues when in reality, paw lesions are only indicative of poor humidity control during brooding due to either inappropriate ventilation or drinker system management.

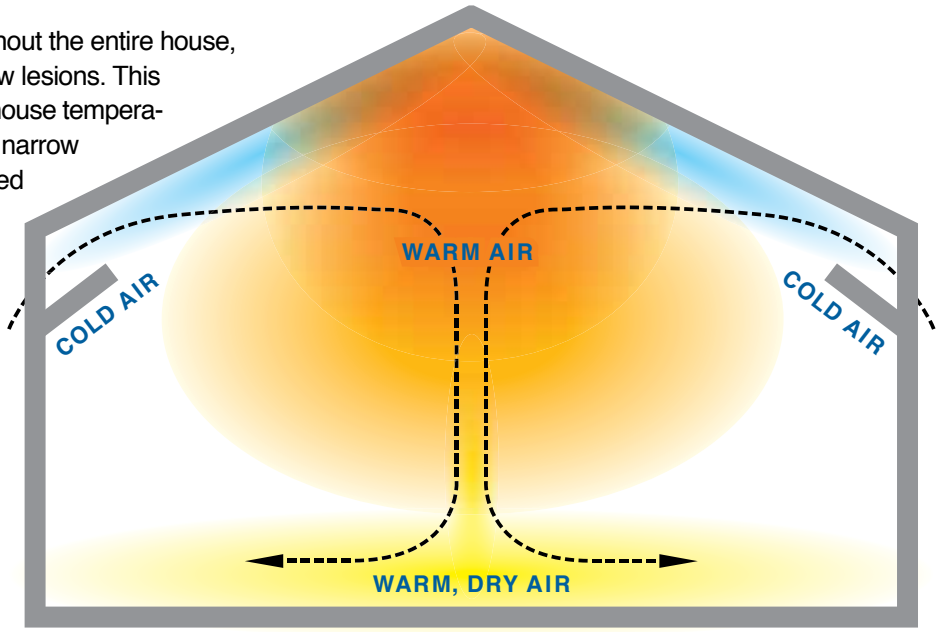


Figure 3.
Controlling air flow through inlets

Litter Amendments

The use of litter amendments in modern poultry production has also dramatically improved the air quality within poultry houses. Proper floor heating through the use of radiant brooders and the ability to control the direction and velocity of air flow into the house have allowed producers to minimize cake formation and ammonia production. While air quality is improving, higher bird weights and subsequent manure production have increased, creating challenges due to increased ammonia. Ammonia levels above 25 PPM are detrimental to bird health, welfare and productivity. Integrators and producers have embraced the use of litter amendments like sodium bisulfate, PLT® Litter Acidifier, to bind the ammonia within a poultry house and maintain appropriate ammonia levels. Initially, products like PLT® were only used in the brood chamber to control ammonia. Now it is not uncommon to see integrators and producers treating the whole house at placement and then following up with a second mid-flock application sometime between 14 and 21 days in order to maintain the safe ammonia levels for an extended period of time. This second mid-flock application of PLT® not only enhances animal welfare by maintaining air quality for a longer period of time, it also improves bird productivity by increasing weights and lowering feed conversions.

Bird Density

Bird density within houses is a particular issue that draws significant criticism from people outside the industry. Bird density is especially scrutinized in European poultry production; however, the real issue is not bird density as much as it is about moisture control. The high quantity of birds within a house, the more humidity pressure is placed on the housing environment. So the real issue isn't bird density, but the need for greater attention to moisture control as bird density increases. One prominent example occurs in brooding. For a small Cornish Hen bird program, there may be 30,000 chicks in a 10,000 sq ft brood chamber while in a roaster program, there are 20,000 birds in a 10,000 sq ft brood chamber. In the house with the larger number of birds, relative humidity will build more quickly and require an increase in ventilation several days sooner. The greater the bird density within a house, the higher the risk of error in controlling relative humidity during minimum ventilation. As long as the producer is monitoring relative humidity and ventilating appropriately, higher density does not negatively affect bird welfare. In American production houses, the nearly universal presence of dirt pads and built-up litter make a house far more forgiving in terms of moisture control. These two features are often viewed as sacrilege to those on the outside but they provide great advantage to raising birds at a higher density without any concurrent welfare issues. Houses with concrete floors and new litter make it difficult to control relative humidity and moisture, causing litter conditions to deteriorate quickly. So it is not the density that is detrimental to bird welfare, it is the lack of moisture control to maintain litter conditions that is truly the problem. If moisture and relative humidity are maintained, the higher density is of no concern to the welfare of the bird.

Conventional House vs Free Range

Retail and activist driven animal welfare programs are increasingly dictating bird management in the United States. In some ways, they have caused the industry to turn a more critical eye towards management practices and have helped refine management programs; however, in other ways they have resulted in reality-distorting perceptions to become prevalent. For example, the increasing popularity of free-range poultry and the ensuing requirement for outdoor access in order to participate in the organic market. While this may sound enticing and beneficial, in reality it often decreases the welfare of poultry. Increasing the amount of openings in the house for outdoor access has the unintended consequence of making houses very difficult to ventilate properly by lowering the static pressure or breaking tunnel ventilation. This reduces bird welfare by causing temperature fluctuations and an increase in relative humidity because directional airflow and wind speed can no longer be maintained as shown in Figure 4. The loss of ventilation integrity precipitates greater heat stress on the bird, potentially resulting in death.

Injury rates often increase as well due to outdoors access. Inside a conventional house, chickens are safe from the dangers of the outside world. In the free-range pens, however, there is the chance of predation from birds of prey, foxes, and other mammals. The use of enrichments such as hay bales and wooden boxes that are required by some of the most stringent animal welfare programs often result in a high rate of leg injury and bone breakage. Certain enrichments make it easier for small birds to be bullied and preyed upon by larger chickens. So again, the perception of improving animal welfare does not match reality.

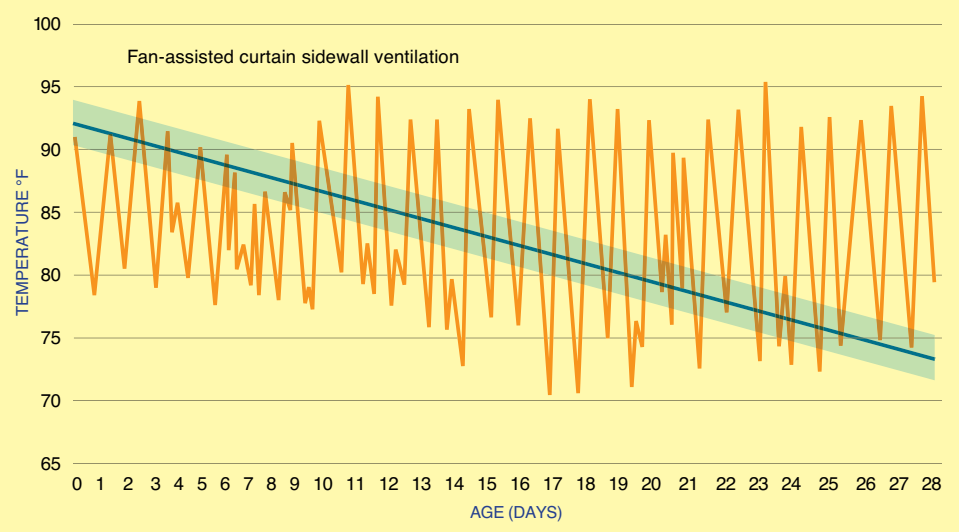


Figure 4. Temperature fluctuations

Antibiotic Use

Additionally, a number of the more aggressive animal welfare programs restrict the use of feed delivered antibiotics and/or coccidiostats in a misguided attempt to improve the welfare and health of the birds. In reality, gut integrity is often compromised, mortality increases and there is a higher incidence of pathogens within flocks. Birds raised on gut-modifying antibiotics have a much lower incidence of disease and processing condemnations because of the maintenance of gut integrity. Lower disease incidence and gut preservation are important for the welfare and health of the bird.

Conclusion

Modern technological advances in housing, litter amendments, and feed formulations have transformed the poultry industry in a manner conducive to improved bird welfare. The ability to strictly control the bird's environment allows for exponentially better housing conditions, enhancing animal welfare in a fashion unimaginable to most consumers and retail-level animal welfare activists.

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