

# Economics of Commercial Layer House Ventilation

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**Good ventilation is vital to optimum egg production at lowest possible cost** →

An environmentally controlled poultry house is one in which temperature, air quality, air flow rate, and even light intensity can be modified by the operator to meet a desired standard. The goal is to provide, as far as is economically possible, the optimum requirements for best bird health, freedom from stress, and the most efficient utilization of feed for good egg production. Ventilation is the key element in environmental control, and in most cases temperature is the most critical environmental factor to be controlled. Thus the design and management of the ventilation system are vital to achieving optimum egg production at the lowest possible cost.

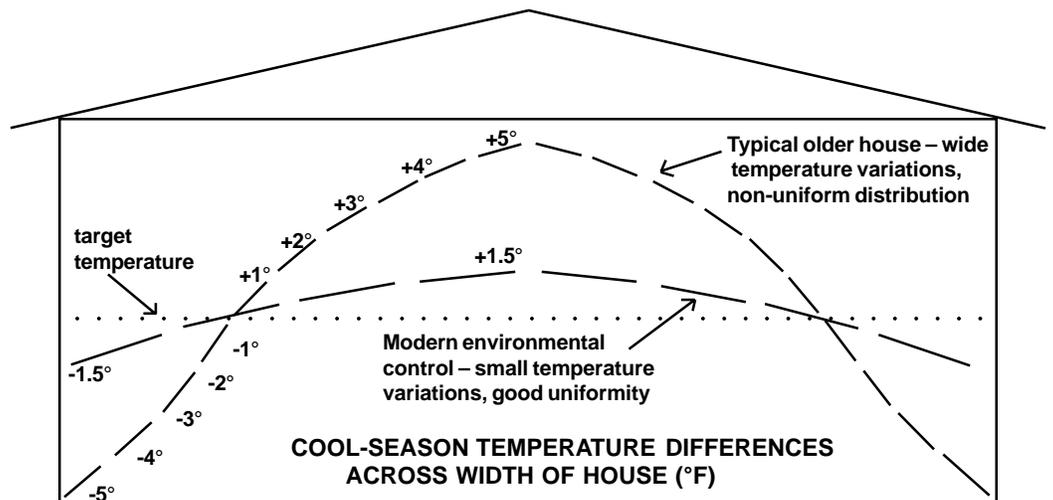
**The challenge: select and consistently maintain the right target temperature** →

The temperature requirements of laying hens vary according to their age. Optimum temperature for best production is typically lowest as they begin laying, rises slightly until they reach peak production, levels off for some time, then drops somewhat as the birds age further. Temperature requirements also are known to vary somewhat from flock to flock. One of the challenges to successful ventilation management is selecting the right target temperature for the particular situation. The next challenge is managing the system to maintain the target optimum temperature in the house as consistently as possible. While no operator and no ventilation system can be expected to maintain perfectly exact temperature control, the goal always is to get as close as possible to the target temperature, avoid temperature swings of more than a few degrees, and maintain temperature uniformity throughout the house from end to end and top tier to bottom tier.

**Getting temperature right on average won't help if temperature range making up that average is too wide** →

Modern environmental control systems enable operators to fairly closely control in-house temperatures, at least on the average. One of the biggest current problems is achieving good temperature uniformity in the house. A limited number of studies have been done in commercial egg houses that show temperature differentials across building widths, from end to end of a house, and also from the bottom tier of cages to the top. The exact pattern and extent of the deviations of course depend on the particular building design, the environmental control system used, and the level of management. But it is not unusual to find temperatures in different parts of a house ranging 10 degrees F (5.6°C) or more above and below the desired temperature. The illustration below shows the kind of cool-season temperature variations across the width of a house that are likely to be seen in older houses, compared with the much more even temperature distribution possible with the best modern

**Good temperature uniformity requires well-managed and up-to-date environmental control** →



Temperature control is cost control because temperature affects feed intake

Non-uniform temperatures lead to non-uniform flock body weight problems

Wide swings in temperature show up in higher feed intake per egg laid

Controlling temperature is as important to profit as good feed and water

ventilation technology under good management. If temperatures vary more than one or two degrees across the house, or from top to bottom, even if the *average* in-house temperature is as desired — typically, this will be in the vicinity of the sensors — then only a fraction of the hens will be experiencing the desired temperature.

Temperature differentials have considerable economic implications because temperature influences egg size and, most importantly, feed intake. Where temperatures are persistently higher than desired, birds will consume less feed and may not get the required nutrient intake for best egg production. Where temperatures are too low, birds tend to consume more feed, which increases the cost without improving production. In time, temperature stratification, and the accompanying variations in feed intake, also affect the body weight uniformity of the flock. Birds in warmer regions of the house tend to lose body weight and birds in cooler regions tend to gain weight. This results in even greater feed intake differentials and makes ventilation management even more difficult because the target temperature goal depends to a great extent on bird size. There is no way to provide “optimum temperature” for a flock with varying sizes of birds.

To illustrate the profound effect that temperature management can have on cost of production and profitability, consider the following real world example, based on actual field data observed in a Midwest commercial complex where modern, controller-operated environmental housing is being compared to older fan-ventilated facilities with poor temperature and ventilation management. Two houses, each containing 100,000 hens, are being compared on a yearly basis. The study has not been completed, so that temperature control data are available for cool-season ventilation only, but the findings are already significant:

	<u>Modern House</u>	<u>Older House</u>
Observed temperature range (cool weather)	74° - 82° F	55° - 85° F
Feed consumption per dozen eggs produced	3.2 lb	3.7 lb
Feed cost per dozen eggs (@ \$145/ton)	\$0.23200	\$0.26825

In the older house, with temperatures ranging over 30 degrees F (from 55° to 85° F), feed consumption averages one-half pound more feed consumed per dozen eggs produced. At a feed cost of \$145 per ton, or \$0.0725 per pound, this means that the feed cost per dozen eggs in the modern house – with only an 8-degree temperature range – is \$.03625 per dozen lower than in the older house.

Although the data cover only cool-season production, it is unlikely that the modern house would have less of an advantage over the older house in hot weather. If we assume similar feed intake vs egg production differences continue, and assume an annual average of 20 dozen eggs per hen, feed costs for the modern house would be \$72,500 per year less than for the older house:

$$20 \text{ dozen/yr/hen} \times \$0.03625/\text{dozen} = \$0.725 \text{ per hen/yr} \times 100,000 \text{ hens} = \$72,500/\text{yr}$$

This is of course only one example, but it is consistent with published reports of other field tests showing savings of \$0.50 per hen per year and more from closer temperature control in layer housing. And it well illustrates the profound effect temperature has on feed consumption and on the cost of production. Other factors, such as egg size, shell quality, and mortality are also very important and have economic value. But even if we look only at the feed consumption factor, it is becoming clearer and clearer that effective temperature control is as important to economics and profit of production as good feed and water.