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Poultry Housing Tips

Using Steel Rod Instead of Cable for Air Inlets

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One of the keys to maintaining uniform conditions throughout a poultry house as well as keeping fuel usage to a minimum, is making sure that when we bring fresh air into a house during cooler times of the year that we distribute it evenly throughout the house. It's fairly simple; if we bring twice the cold air into one end of a house than the other, the air quality will be twice as fresh on the end receiving more air as well as significantly cooler. Of course, on the opposite end of the house the air will be significantly warmer and more stale. Fuel usage will be increased because of the simple fact that if we bring in twice the cold air into one area of the house the temperature will drop twice as much on this end increasing the likelihood that the furnaces/brooders in that area will have to come on to maintain the desired temperature. If the air is evenly distributed throughout the house the temperature would not drop as much, reducing the likelihood that the brooders/furnaces would come on.

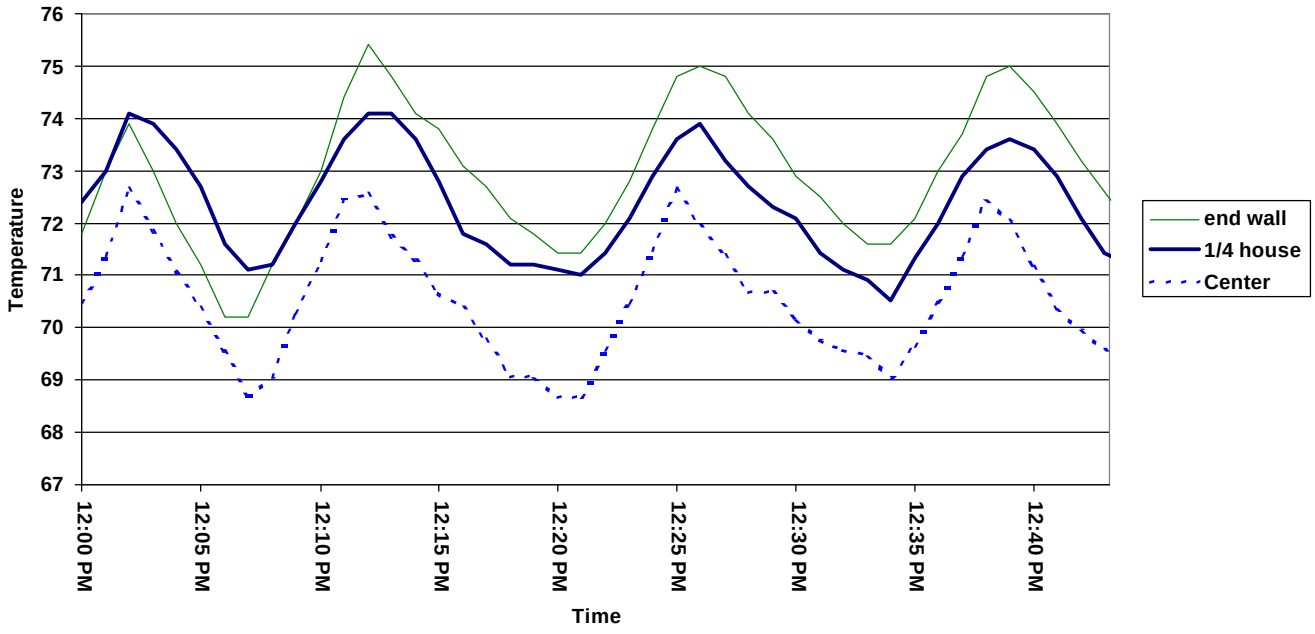

Figure 1. Temperature variation caused by cable stretch and sag.

To insure that we bring in air uniformly throughout a house it is crucial that all the air inlets in a house open the same amount when exhaust fans come on. This means that there should be less than 1" difference in inlet opening throughout a house. One-inch difference may not seem like much, but it can have a significant effect on conditions in the house. For instance, in Figure 1 when the timer fans turned on, the inlets at the center of a house open 1 1/2" while the inlets near the end walls of the house only opened 1/2" inch (the inlet machine was in the center of the house and inlet cable was pulled taut by a spring on each end of the house). The resulting 1" difference in inlet opening resulted in a three-degree variation in air temperature between the center of the house and the ends. This difference is understandable considering about three times as much fresh air is coming into the center of the house as compared to the ends of the house.

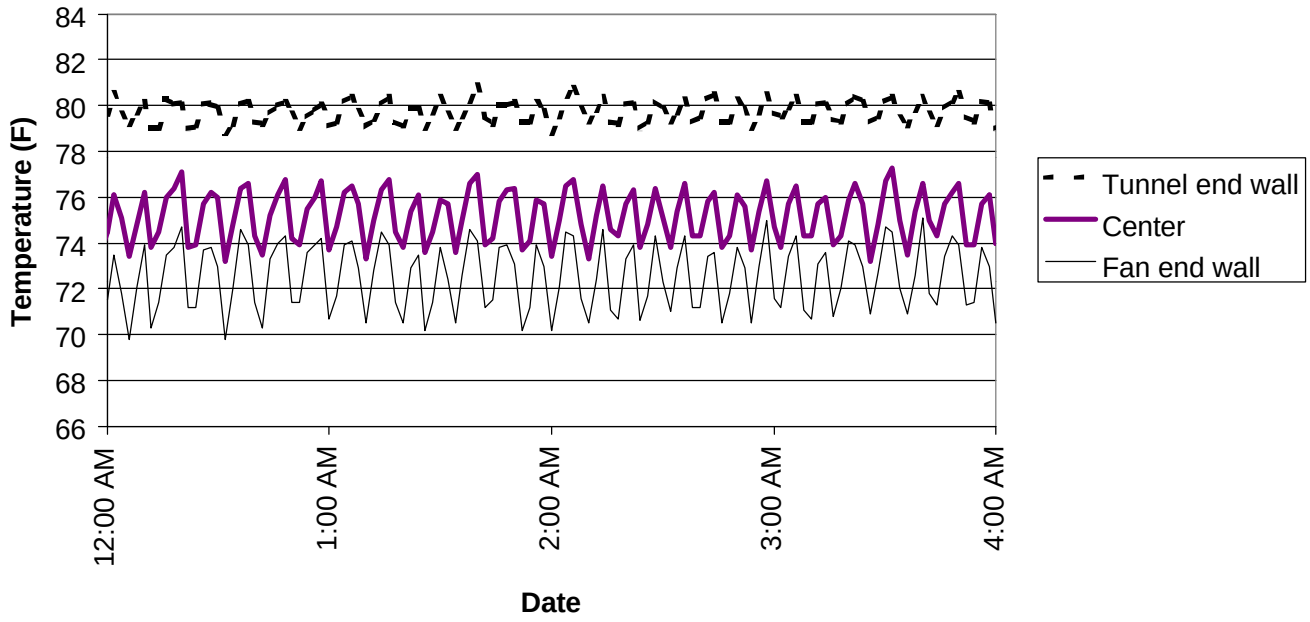

Figure 2. Two inch variation in inlet opening.

A three-degree variation is probably not much to be concerned with, but what if the variation in inlet opening was not an inch from the center of the house to the ends, but two inches from one end of a house to the other? (The inlet machine is at the tunnel fan end of the house and the inlet cable is pulled taut by a spring at the tunnel curtain end of the house.) This scenario can be seen in Figure 2 where instead of a three-degree variation in house temperature there was a ten-degree difference between ends of the house. In the center of the house the desired temperature of 75^0F was being maintained. But, since the inlets were open too little at the tunnel curtain the birds were five degrees too warm and the air was stuffy. At the tunnel fan end of the house the inlets were open too much and as a result the house was five degrees too cool and drafty. If the furnaces were set to come on at 70^0F a significant amount of fuel would have been used which would not have been necessary if all the inlets opened the proper amount.

The number-one cause of variation in inlet opening is cable stretch and sag. The stretching and sagging of the inlet machine cable results in the inlets nearest the inlet machine opening faster than those near the ends. To minimize stretch and sag a counterweight or spring must be added to the end of the cable opposite the inlet machine. As the size of the counterweight or spring is increased, cable sag and stretch is reduced, and uniformity of inlet opening is increased. This can easily be seen in any broiler house which uses cable to open and close inlets. Take the counterweight off (or loosen the spring) at the end of the cable, then open the inlets with your inlet machine. You will see a dramatic difference in inlet opening. Depending on the length of the cable, the inlets nearest the machine may open 2" or more before the inlets at the end of the cable begin to open. As you increase the amount of weight, you will see that the amount of inlet opening nearest the machine will remain the same while those nearest the weight

will open more and more as the weight is increased. Bottom line, the greater the size of the counterweight, the more uniform the inlets will open.

The downside of increasing counterweight size is that the wear and tear of the cable as it moves around pulleys is dramatically increased, resulting in the likelihood of cable breakage. The other problem is that increasing counterweight size does not reduce cable twist and sometimes will actually increase it.

The best solution is to use steel rod instead of cable to open and close side wall inlets. The advantage of steel rod is that for all practical purposes it does not stretch and is far less likely to sag than cable. As a result, when an inlet near the machine opens 1", inlets at the end of the cable also open 1". Since the rod does not stretch, less weight is required to keep all the inlets opening the same amount. The rod will not twist so you do not have to worry about cable strings wrapping themselves around the rod.

Steel rod for inlets has been in poultry houses for decades. The reason why it is not in widespread use has primarily to do with cost. Traditional rod systems cost over 70 cents per foot. Considering the fact that a 5/32" inch 7 X 19 cable cost about 10 cents a foot, most producers found it very difficult to justify the cost difference. Furthermore, traditional rod systems came in eight- or ten-foot sections that had to be either threaded together or clamped together with cable clamps which required a significant amount of labor and dramatically increased installation cost.

Figure 3. Roll of steel inlet rod.

Over the last year a new type of steel rod has been tested on two different broiler farms by the University of Georgia's Extension Engineering Department. The 3/16" diameter, heat-treated rod does not come in ten-foot sections but rather a five-foot diameter roll (the heat treating stiffens the rod as well as minimizes any stretch). The steel rod is simply unrolled and run down the length of the house just like cable, either supported by staples or small pulleys. The rod is attached to the cable at the inlet machine with cable clamps and then to a small piece of cable which is then attached to either the counterweight or spring. Inlet strings are then attached to the rod using plastic wing nuts. A house can be converted from cable to steel rod in just a few hours. In addition to being easy to install, the new steel rod is relatively inexpensive, about 20 cents per foot.

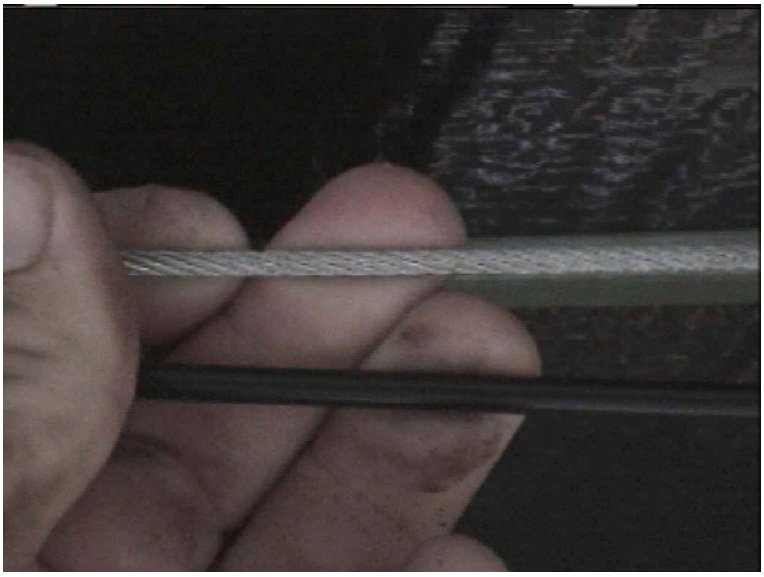

Figure 4. Cable and rod, side by side

Figure 5 shows a house where inlets on the south side of the house were opened and closed using standard cable while those on the north were opened using the new steel rod system. In the first half of the graph the inlets on the north side of the house were latched closed so only those on the cable operated. With the cable there was a 1" variation between the center of the house, where the inlet machine was located, and the ends of the house. In the second half of the graph the inlets on the south side of the house (cable side) were latched closed and those on the north side of the house were unlatched. With the steel rod there was less than 1/4" variation in inlet opening and as a result air temperatures were significantly uniform.

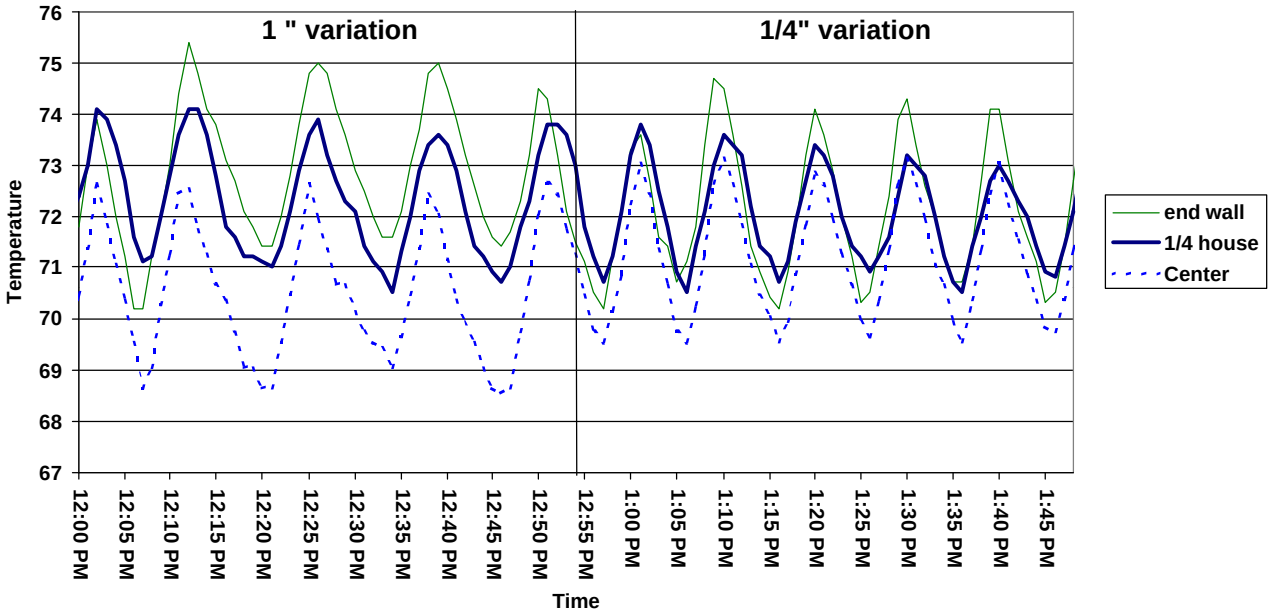

Figure 5. Effect of reducing inlet opening variation from 1" to 1/4"

The steel rod was also installed in a house where the inlet machine was installed near the tunnel fans and ran the entire length of the house. Even in a 500' run the variation in inlet opening was kept to less than 1" as compared to 2" with cable. As a result, environmental conditions were very uniform throughout the house (Figure 6).

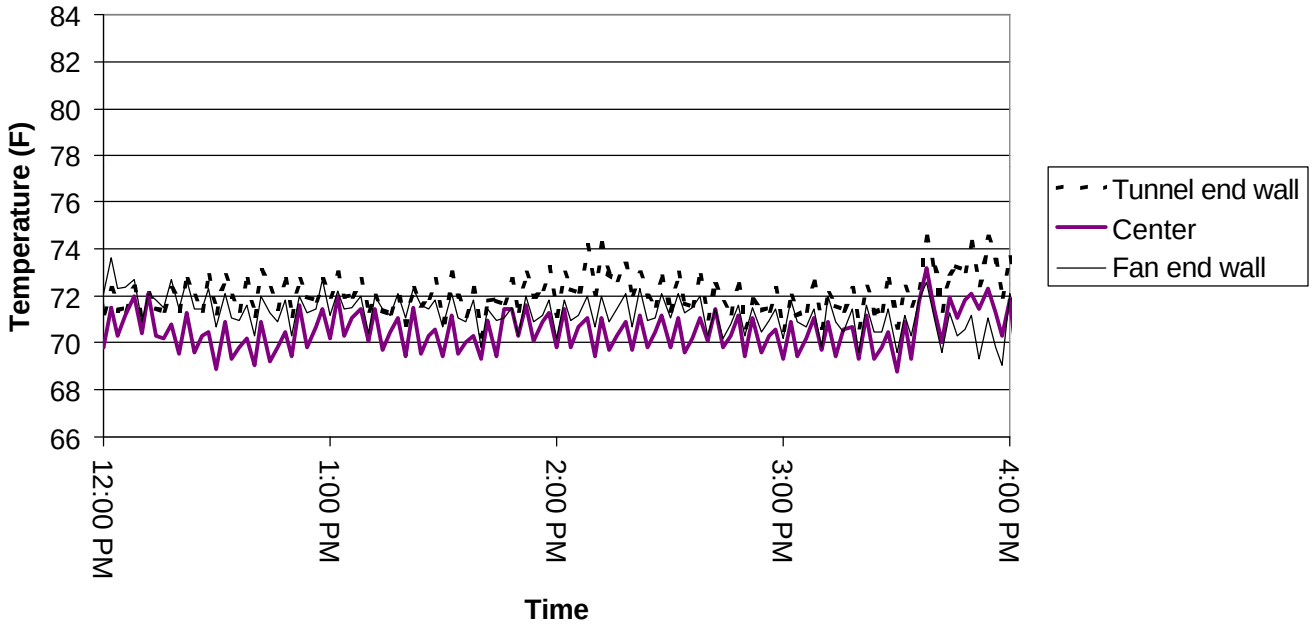

Figure 6. Temperatures in a 500' house with steel rod

One of the best things about using steel rod is that since it does not stretch inlets do not need to be continuously adjusted, provided a low stretch string is used to connect the inlet doors to the rod. If any adjustment needs to be made the plastic wing nut on the rod can be quickly loosened and stretched string can be tightened (Figure 7,8). Last but not least, steel rod systems last for the life of the buildings. There are many houses in the U.S. that have rod systems that are over 15 years old.

Figure 7. Steel rod and inlet string.

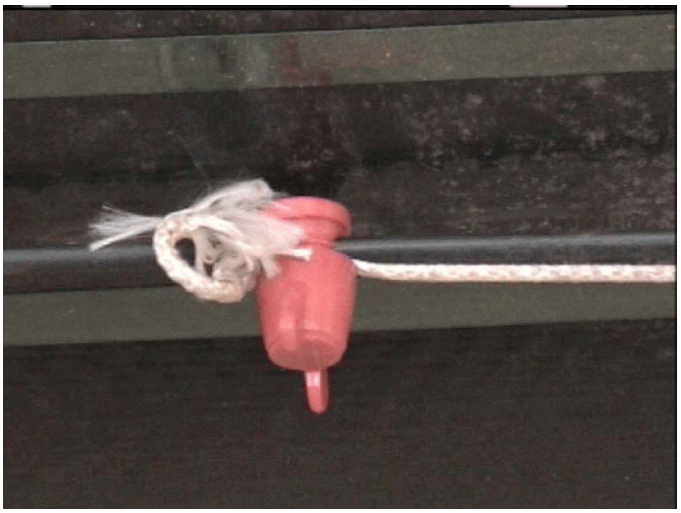

Figure 8. Inlet string attached to rod.

Though steel rod costs more than cable it will likely pay for itself in relatively short order. By insuring that fresh air is evenly distributed throughout the house, hot and cold spots will be reduced which will result in lower fuel usage and improved bird performance. The need for constantly adjusting inlets will be eliminated which will reduce labor. Last but not least, the steel rod reduces the need for very heavy counterweights which should reduce wear and tear of the remaining cable as it moves around turning pulleys, thereby reducing the likelihood of cables breaking and inlets falling open.

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