The University of Georgia

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Poultry Housing Tips

Blown Stabilized Fiberglass Vs. Blown Cellulose Insulation...2 ½ Years Post Installation

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Figure 1. Blown stabilized fiberglass (foreground) and blown cellulose insulation (background)

In August of 2008 a study was initiated to compare the long term integrity of blown stabilized fiberglass insulation (Stable R®, Guardian Building Products*) to traditional blown cellulose insulation (Figure 1). Stabilized fiberglass insulation is a fiberglass insulation product with special binders that causes the fiberglass insulation to tend to stick together after it is installed (see the January, 2009 edition of *Poultry Housing Tips*). Since blown stabilized fiberglass insulation was developed for use in ceilings in residential houses with slopes as high as 45 degrees, it was hoped that it would be less prone to settling and shifting problems sometimes seen in houses insulated with traditional blown cellulose insulation. The study is being conducted in a recently constructed 66' X 600' broiler house. 500 feet of the ceiling of the study house was insulated using approximately six inches of traditional blown cellulose insulation (to the top of the 2" X 6" bottom cord of the roof truss, R-value = 20 ft^2*hr/Btu's). To help prevent the shifting of insulation away from the ceiling peak, a six foot long piece of six-inch thick fiberglass batt was placed along the ceiling peak then covered with a thin layer of blown cellulose insulation. Towards the center of the house, a 100' section of ceiling was insulated solely with eight to nine inches of blown stabilized fiberglass insulation (R-value = 26 ft^2*hr/Btu's, Figure 4).

In February of 2009, approximately six months after the installation of the blown fiberglass and cellulose insulation products, the farm was visited to note any changes that had taken place since installation. While no significant changes were found in the portion of the ceiling insulated with the blown stabilized fiberglass insulation, the depth of the blown cellulose insulation had decreased between ½" to 1" (Figure 2).

In February of 2011 the farm was visited once again to document any changes that had taken placed since the ceiling was insulated. Though there were no significant changes in the stabilized fiberglass insulation, the depth of the blown cellulose insulation had decreased between one and two inches since installation (There were some isolated areas of the ceiling, near the eaves, where the reduction in depth was closer to three inches - Figure 5). It is important to note that what appeared to be settling near the eaves may be in part due to the movement of insulation caused by increased air velocities that generally occur in this area of the attic on windy days and the fact that the original insulation depth was slightly less due to difficulties involved in blowing insulation near the eaves of a house. In general, what was originally a ceiling with a R-value of 20 ft^2*hr/Btu's (5 ½" blown cellulose) after two and a half years had decreased to one with a R-value of 15 ft^2*hr/Btu's (4" blown cellulose).

Figure 2. Blown cellulose insulation (January, 2009. Six months after installation)

Figure 3. Blown cellulose insulation (February, 2011. Two years, six months after installation)

Figure 4. Blown stabilized fiberglass insulation (January, 2009. Three months after installation)

Figure 5. Blown stabilized fiberglass insulation (February, 2011. Two years and four months after installation)

Though the insulation value of the blown cellulose insulation was significantly lower than the blown stabilized fiberglass insulation , thermal images taken in the attic on a cold day with relatively young birds (80^{o}F inside, 40^{o}F outside) did not show a significant difference in attic insulation temperatures (Figures 6 and 7). This in general is not overly surprising due to the fact that once a certain level of ceiling insulation is reached, adding insulation doesn't tend to dramatically change the amount of heat flow through the ceiling. For instance, if a ceiling in a 40' x 500' house has an R-value of 30 ft^{2}*hr/Btu's, approximately 33,300 Btu's of heat will flow through the ceiling each hour (0.35 gallons of propane) when it is 80^{o}F inside and 30^{o}F outside. If the ceiling insulation is cut in half to R-15 ft^{2}*hr/Btu's the heat flow through the ceiling will be double to 66,600 Btu's/hr, an increase of 0.7 gallons of propane per hour, not what most would consider a substantial increase in heat costs. The fact is that a ceiling with an R-value of 15 ft^{2}*hr/Btu's is not of great concern because the heat flow through the ceiling is still "relatively" minimal, but if the depth of the blown cellulose insulation were to continue to decrease it will not be long before the heat loss through the ceiling will become of significant concern. For example, if the blown cellulose insulation were to decrease another couple of inches in thickness the heat loss through the ceiling would double and heating

costs would increase to 1.4 gallons per hour, four times that of a ceiling with an R-value of 30 ft^2*hr/Btu's. This would amount to an increase heat cost approximately $440 a week over a ceiling with an R-value of 30 ft^2*hr/Btu's (@ $2.50 gallon propane).

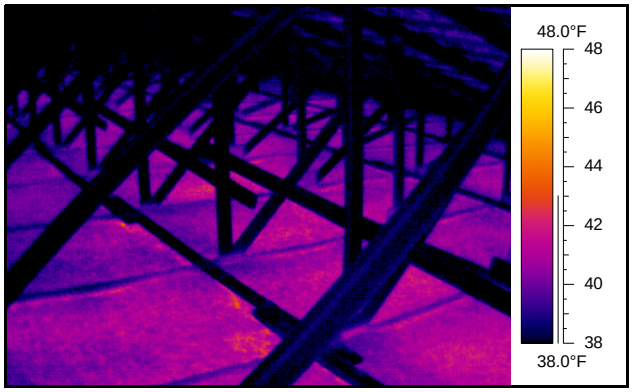

Figure 6. Thermal image of blown cellulose insulation.

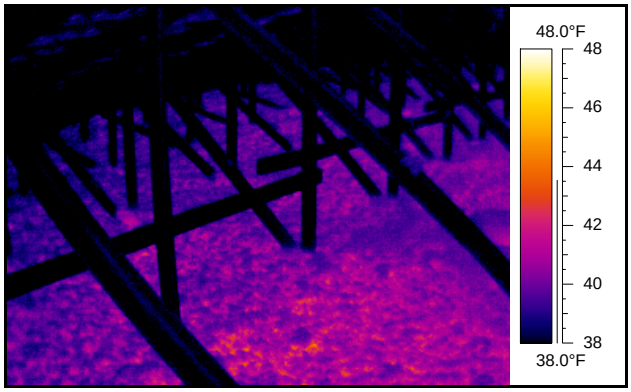

Figure 7. Thermal image of blown fiberglass insulation.

Though there were no signs of either type of insulation moving away from the peak of ceiling peak, it is thought that since the blown stabilized fiberglass insulation covers the "stringers" (rows of 2 X 4's that tie the bottom cord of the trusses together - Figures 3,4, 6, and 7) the insulation will be, to some extent, held in place by the "stringers". Though the same would hold true if the cellulose insulation was blown to the same depth as the stabilized fiberglass insulation, it is doubtful that it would be as effective due to fact that over time the cellulose insulation would likely settle to the point where it would be lower than the stringers. Furthermore, it is important keep in mind that eight to nine inches of blown cellulose insulation would represent a 40% increase in weight over the more traditional depth of five to six inches. A depth of eight to nine inches of blown stabilized fiberglass insulation is not particularly problematic due to the fact that it generally weighs 30% less per inch of thickness than blown cellulose insulation.

Though the study comparing stabilized blown fiberglass to blown cellulose insulation is far from over, results to this point confirm the DOE recommendation that when using blown cellulose insulation, installers should take into account the fact that the insulation will settle approximately 20% over time (compared to 2 to 4 percent for fiberglass). Settling may be greater, as observed in this study, in poultry houses due in part to the movement of the dropped ceilings as fans turn on and off.

To date both types of insulation to date are doing an adequate job of keeping ceiling heat loss/gain to a minimum. And though it is doubtful that depth of the blown cellulose insulation will decrease another inch or two over the next two years considering the fact that settling tends to slow over time, it is clear that blown stabilized fiberglass insulation is far less susceptible to settling than traditional blown cellulose insulation.

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