

Poultry Engineering, Economics & Management

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***Critical Information for Improved Bird Performance Through Better House
and Ventilation System Design, Operation and Management***

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Avoiding Snow Disaster

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Since heavy snow is a seldom occurring event in the deep Southeast, the question of how to deal with or prepare for snow events is very seldom at the top of the list of questions we get from Southeast growers. However, when a snow of any magnitude does occur, as has happened this winter, the question becomes urgent. Many growers are now asking, "What should I do to alleviate snow loads on my chicken house and keep it from being damaged or even collapsing?"

This question is best answered before the fact, so that one may have a "game plan" ready and in place before the event occurs. There are many factors that all tie into the answer to the main question and will need to be examined further. As anyone with poultry houses knows, when one thing is done, it often affects several other things, some of which can have detrimental results.

First, a grower needs to know how much snow load the poultry house was designed and built to withstand – and make sure, through regular inspection and repairs, if needed, that the house can still meet that standard. Second, a grower should have some knowledge of snow loading factors to be able to judge the actual weight on the roof if and when snow does arrive. These steps provide the basis for making appropriate decisions about what to do – and what not to do – when a heavy snow comes down. This newsletter is intended primarily for Southeastern US growers, but should be relevant to growers anywhere looking for basic information on how to get ready for snow and minimize the chances of experiencing a snow disaster.



The collapse of a poultry house is a devastating event to all involved. What causes one roof to collapse when the one beside it, built the same, of similar materials and with similar methods, still stands?

The question of whether a given poultry house roof is likely to fail under snow load can only be answered by visually inspecting the attic of the house before snow arrives.

This newsletter focuses on key tips on inspecting house roof systems to detect weaknesses that could lead to a snow disaster, as well as providing guidelines for dealing with snow when it does arrive.

Is My House Ready for Snow?

Every poultry grower needs to have intimate knowledge of the condition of the roof system of their houses. The age and overall integrity of the truss system is important to know, not only in a snow loading situation, but for the wind and rain that are affecting the roof year round. Any weaknesses can cause the roof system to be compromised in such a way as to make the roof more vulnerable to snow loading.

The key word here is "system." The trusses, truss bracing, purlins and metal all work together to make a roof system. If any one of these parts is compromised, the entire system could be in jeopardy. The only way to know what is going on with the system is to visually inspect the attic on a regular basis. It is recommended that at least once a year, a grower enter the attic of each house and have a look around. While it is wise to check every part of the attic, particular attention should be paid to several high risk areas:

1. where heavy equipment loads are attached,
2. the end wall and adjacent trusses, and
3. the middle 1/3 section of the house.

Growers need to be inspecting the metal gang nail fasteners of the trusses in particular. Inspect them for any sign of loosening or bending out of the truss. Also check these for corrosion. Next, attention should be paid to the straightness of each member of the truss – top/bottom chords and bracing. Any bowing or warping of a member can spell problems to come. Checking for signs of leaks in the roof is also best done from the attic. Leaks cause corrosion and rot if left long term. Close inspection of the purlins can reveal leaks and loose fasteners.

Remember that all the roof is a system, any breakdown at any one part can weaken the entire system. Such weaknesses are amplified under a snow load situation. If any deficiencies in the roof system are found, contact a reputable building contractor and/or truss manufacturer and pursue repairs immediately. Knowing the integrity of the roof system is important when making the decision of what to do in a snow load situation.

Exactly How Heavy Is That Snow Load?

Growers need to have an understanding of how much snow weight their buildings are withstanding. The weight difference of light/dry snow verses wet snow verses ice is substantial, and growers must consider the type of snow load on the house, along with the roof snow loading design capability, when making a decision for action. Most newer construction in Alabama since 2005 was designed with 10 lbs/square foot of roof area for "ground snow load." Older construction, particularly roofs with a 4/12 pitch, may not be able to withstand that much snow load. The table on the facing page shows the number of inches of each type of "snow load" a typical poultry house can withstand. For example, an older house with a snow loading design capability of 5 lbs/sq ft should be able to stand up to almost 20 inches of light, dry snow, but is likely to fail under less than three inches of heavy, wet snow. Notice that ice is significantly heavier than even wet snow.

If a house roof system is compromised in any way, the amount a roof can withstand will be significantly reduced. Knowing the condition of the house roof system, a grower can take the information from the table, estimate how much snow load his house may be able to withstand, and decide if anything needs to be done and how urgent the action needs to be. There is also a time factor calculated into the design loads for trusses. The longer the snow remains on the house, the more stressed the roof becomes.

What Are the Best Ways to Deal With a Heavy Snow Load?

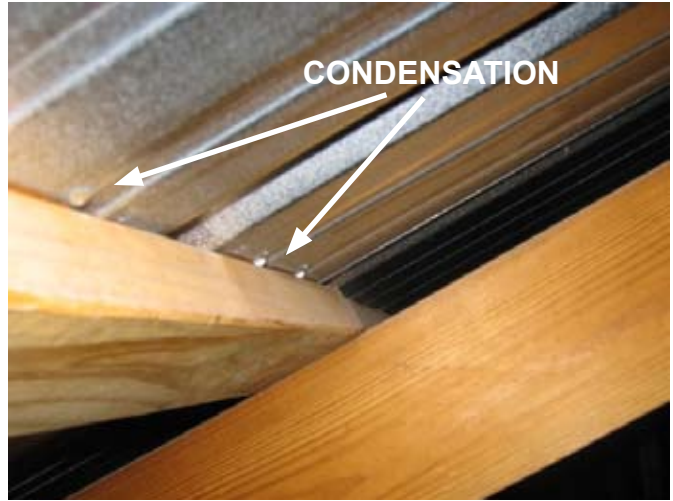
Once it is decided that a house may be in jeopardy, the question is what to do to avoid damage. A lot of houses in the Southeast have not just a single attic access point but what have been called "snow holes" – multiple attic access panels cut into the ceilings, commonly placed at about 80-foot intervals and usually 3 feet square with various kinds of movable panels inside as a barrier between bird space and the attic. The question is: "Should growers open these panels, allowing warm bird air into the attic, thereby warming that space and hopefully melting the snow off the roof?"

This sounds easy enough but there is more to it than what is seen at first glance. Proper exploration of the scenario needs to be done. The overriding concern is condensation. With attic spaces having temperatures often 50 degrees less than the bird space and typically with low humidity, allowing warm moist "bird air" to flow into that space will cause massive condensation. As this warm air loaded with moisture from the birds and drinkers comes in contact with the cold surfaces in the attic, it offloads that moisture onto everything in the attic. All the trusses, purlins, metal roofing and insulation get a coating of water. It could be described as "turning the fogger nozzles on in the attic." This can be none too beneficial to the otherwise dry lumber and detrimental to ceiling insulation.

The other fact to analyze is the spacing of access panels. At one every 80 feet, you are not going to get an even heating of the attic space. On a typical 500-foot house, you will have five panels. Therefore you will have five



This is a close-up photo of a roof truss gang nailing plate. Notice the metal plate separating from the lumber truss member, especially at the top of this picture. If the house is put under a heavy snow load, this loosened truss plate could lead to failure of the truss, which in turn could cause the entire roof to fail. Routine inspection of truss plates for damage or loosening, and prompt repairs if such problems are found, is essential to avoid potential snow disaster.



Photos above show the heavy attic condensation that can be caused by opening attic access panels. Warm and moist bird air condensing on roofing panels, as in left photo, will lead to premature rusting. Drips onto lumber, as in the photo of the purlin at right, lead to premature rotting of the roof support structure. Condensation can also cause major damage to insulation. Opening attic panels is not likely to melt enough snow off the roof to be worth taking the risk of major condensation damage.

Equivalent inches of snow/ice load-bearing capability

Roof Design Snow Load	Light/Dry snow	Heavy/Wet snow	Ice	Water
5 lbs/sq ft	19.2 inches	2.9 inches	1.0 inch	1.0 inch
10 lbs/sq ft	38.4 inches	5.8 inches	2.1 inches	1.9 inches

areas that receive the bulk of the warm air and the bulk of the moisture. The roof may only get five relatively small areas of snow melting from this warm air. It may also get five areas of insulation severely compressed from moisture. The untreated, kiln dried lumber in the attic will also soak up some of this moisture. This can cause wood grain expansion. The following summer, when the attic reaches 140 degrees and more, the wood will again dry out and contract. The more this expansion/contraction occurs, the more every fastener becomes loose— this means purlins, braces and gang nails holding the trusses together can become loose. Untreated wood and moisture do not make good partners. Growers need to consider carefully the impact of opening the attic panels before they expose such a structurally important area as the chicken house attic to excess moisture.

Someone may say “but if it means saving my house, I’ll risk it this one time.” This thought might be valid. However, it should lead a grower to consider an obvious question: will it actually do any good, will it really melt enough snow off to help the situation? The answer – it is possible but not probable. Positive outcome will depend on several factors: weakness of your existing trusses, the amount of snow, is there ice, snow or a mixture, how heavy is the snow, what is the outside temperature, amount of ridge vent space, etc. It’s possible that opening the access panels may be of some help. But if the pitch is 4/12 (more prone to weakness), there is 6 inches of heavy, snow/ice mixture on the roof and it’s still 20 degrees F outside – then opening the attic might not melt enough snow to do any good and your house might still collapse. If you open the access panels and have no collapse, the attic will have been exposed to excess condensation for no reason. The snow that will melt will be at the peak and likely

only those areas above the access panels. If there is a heavy enough blanket of snow, then that may not help much. Most experts think opening the access panels to try to save a house is of little value.

While Southeastern poultry growers do not have to worry about these things that often, and too often find themselves unprepared, northern growers are usually well prepared for snow. One tool they will likely have is a roof rake. They use long-handled roof rakes to pull snow off the roof of dwellings and outbuildings. This could be a better solution to the problem – physical removal of snow from the chicken house roof. If 4 to 6 feet of snow can be pulled off the lower part of the house roof, that will relieve the house of much weight and also allow for the snow above it to have a place to slide to, possibly off the house entirely, when the damming effect of the lower snow is removed.

There are risks to be concerned with here, not the least of which is being hit with an avalanche of falling snow load. Care must be taken to avoid being “snowed under.” It would never be advisable to get on the roof to push snow off. The risk of slipping and falling is obvious and the risk of adding that “one straw of weight that breaks the camel’s back” must also be considered.

A strong word of caution must be stated before any action is taken in or around a house in jeopardy – If it is suspected that collapse is imminent, do not risk injury in attempt to save the house. If the house looks like it is about to fall, or popping and creaking can be heard, it is best to abandon efforts and not risk human casualty. This word of caution emphasizes the need for prior planning and the need for regular inspection to discover and address potential problems with the roof system before catastrophe strikes.

It is always better to avoid the damage potential rather than have to deal with an emergency situation. However, if the emergency is unavoidable, then the methods discussed here can be considered. Only the grower can make that decision correctly and only when considering all the circumstances and factors involved.

The Bottom Line

The financial bottom line for a snow disaster, near-total destruction of the house and loss of an entire flock of chickens, is almost incalculable. The bottom line with respect to *avoiding a snow disaster* is prevention. Inspection and repair before the snow event is critical. A game plan must be in place.

Watch for our next newsletter, which will outline detailed steps for inspection, repair and bracing of damaged or weakened poultry buildings.

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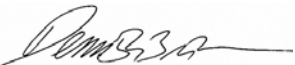




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