Livestock Buildings and Facilities After a Severe Winter

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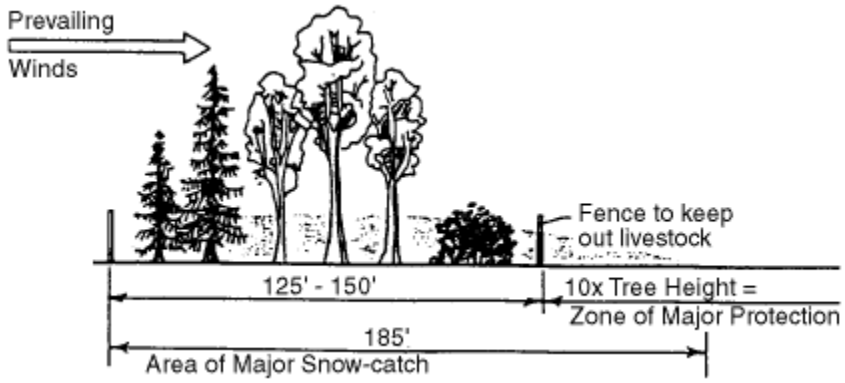
Winters with high amounts of snow and wind are a real test of livestock buildings and facilities. These winters are a time to make a sketch or take pictures of snow accumulations and reflect on how to change the pattern or minimize the effect. The size, density and arrangement of tree belts and the location of buildings all affect snow buildup. Now is a time to consider making changes, particularly looking at possible locations for new tree plantings. If buildings have been destroyed or damaged by snow buildup, now is the time to consider moving the building location or at least making sure the replacement or repair is strong enough to withstand future snow buildups. The following are some items to consider around the farmstead as an individual farmer or rancher reflects on a hard winter.

Wind and Snow Control

Locating buildings too close to tree belts is a common mistake in many farmsteads. A rule of thumb is to locate buildings at least 50 feet and preferably 100 feet away from the nearest tree belt and/or at least 150 to 200 feet away from the farthest tree row on the windward side of the tree belt. Planting several additional tree rows on the windward side of an existing tree belt with 50 to 100 feet of open space between the old and new tree belts makes an excellent snow catcher. A shelter belt needs both tall and short trees, preferably including evergreens and shrubs. Shelter belts should extend at least 50 ft past the area to be protected.

Openings in tree belts or between buildings funnel wind and result in additional snow accumulations in the farmstead. Openings in tree belts can be filled with additional trees, or trees can be planned farther back to help shield driveways. Slatted wood fences can be constructed between buildings to cut down on the wind velocity. Close the top 2 feet of an open-front building to keep out drafts and snow.

Tree and shrub windbreak



Snow on Buildings

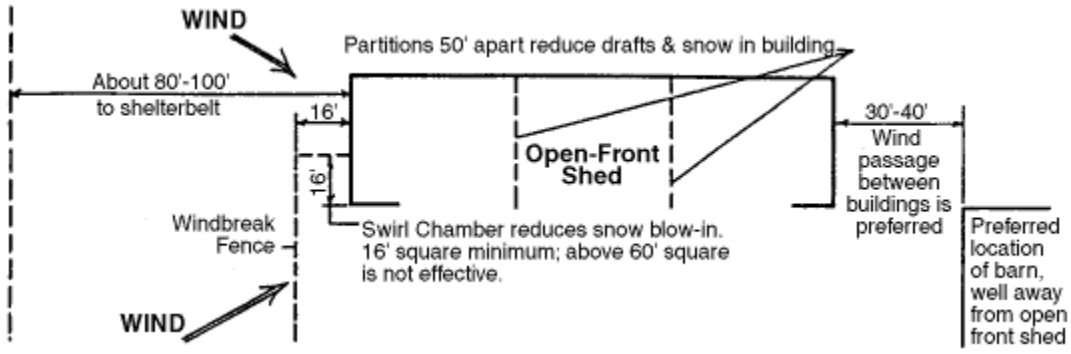
Building failures resulting from snow build up may be due to roofs designed for less than adequate snow loads, poor workmanship, higher than normal amounts of snow, highly compacted snow or other special circumstances. The recommended snow load for agricultural buildings in North Dakota varies from about 24 pounds per square foot (PSF) for most of the state to about 34 PSF in the northeast corner. This is the normal expected snow load. In years with near record amounts of snow, design amounts may be exceeded.

The weight of snow varies greatly, but snow drifted onto a roof is likely to weigh 15 to 20 pounds per cubic foot. Therefore, there is concern if there is more than about 1 to 1.5 ft of drifted snow on an agricultural building roof. Homes should be built to carry about 30 PSF of snow across most of the state and about 40 PSF in the northeast corner. Therefore, a house roof should be able to carry about 1.5 to 2 ft of drifted snow depth. Ice is heavy, about 5 PSF per inch of depth, so just a few inches will cause concern.

Snow drifting off a taller structure onto the roof of a lower building can cause severe roof loading on the lower building. Buildings which are right next to tall tree belts also often end up with severe snow accumulations. In these cases, the snow accumulation needs to be checked periodically and excess snow removed from the roof.

When buildings have had heavy snow accumulations, check connections in trusses and rafters. The excess load may have stressed the connections, and if nails or other connecters have been partially withdrawn or otherwise affected they must be repaired. When repairing failed buildings, replace the failed structural members with new members having at least the same strength. If replacing trussed rafters, make sure the rafter construction and spacing are adequate for the design snow loads. If the building is adjacent to a taller building or right next to a high tree belt, consider going to a roof design that will carry a higher than normal design snow load.

Wind and snow protection of open-front buildings



Farmstead Drainage

Drainage is a critical concern around a farmstead. A 4% to 8% slope is recommended to drain water away from buildings, waterers, and feeding areas. A 6 to 8 ft mound height with a 4 to 1 slope is recommended in livestock lots. About 1 ft of mound length per animal is recommended. The mounds should run parallel to the lot slope. A south slope exposure is best for natural drying. Remove snow from livestock lots and around buildings. Remember that each cubic foot of compacted snow contains about 3 gallons of water. Also, divert roof snow melt from buildings to well drained areas. Nearly 5,000 gallons of water will come from a 1,000 square foot roof with 2 feet of snow depth.

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