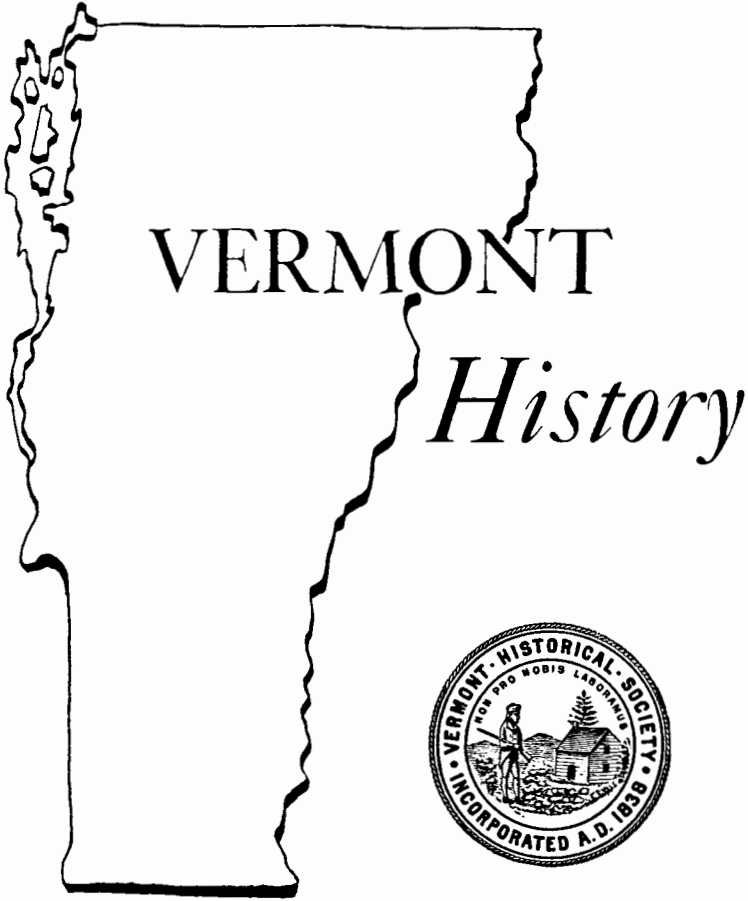


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The reason for the failure and collapse of many of Vermont's older barns was built into them by their owners.

## A Factor in the Collapse of Old Barns in Vermont

By JAN L. LEWANDOSKI

With the passing of each winter collapsed barns punctuate the spring landscape in Vermont. Many modern barns collapse because of dangerous siting (perpendicular to the eaves of a much taller barn) or the improper fabrication of the already low pitched and flimsy truss rafters. In older barns a lack of maintenance, particularly of the roof covering, frequently permits structural members to rot leading to joint failure under snow and wind loading. Even substantial, well-built, and property maintained nineteenth century barns have collapsed or begun to fail.

One reason for the failure of these barns, a universally present problem, was built into them by their owners at some point in their useful life when the high drive became popular. The elevation of a high drive to a point that necessitated cutting through the beams (chords) which tied together both the rafter feet and the long walls of the barn causes rafter spread under loading and walls with little resistance to this outward pressure.

A great variety of framing schemes existed for barns in the nineteenth century, and some included high drives. The typical hay barn built between 1810 and 1875 in Vermont (Figure 1.) had an entry at ground level either at the gable end or along the long walls. Loose hay was piled in these barns by hand or carried to higher levels by a large hay fork on a track operated by ropes and pulleys.<sup>1</sup>

The wholesale introduction of high drives into the older barns which lacked them began in the second half of the nineteenth century and continued throughout the twentieth. This movement initially reflected a desire to stack hay more compactly in order to feed and accommodate a larger number of cattle either at lower levels of the barn or in attached

stables. The practice later spread even to farms which were not expanding as the agricultural community viewed this as a progressive notion of efficiency and convenience.

Beginning around mid-century in Vermont the agricultural sector gradually shifted to dairying as the most important activity. The coming of the railroad increased the market for butter and cheese, and the invention of refrigerated cars spread the milkshed to New York and Boston. Agricultural historian Howard S. Russell noted that the extension of the milkshed was "incentive for farmers along rail routes to build larger barns, which held the increased number of milkers that an assured market made possible and stored the hay needed to keep them through the winter. Even before the fresh milk era, an occasional farmer might tie up 60 cows; but with whole milk shipment, large herds became practical in many places. So the decades following the Civil War saw the erection of numbers of tall, combined hay and stock barns which became a characteristic of New England's countryside."<sup>2</sup>

According to Harold F. Wilson, "Winter dairying became more common—a break with the custom of milking cows during the seven spring, summer and fall months, and allowing them to go dry in the winter. In the 1870's and 1880's growing numbers of farmers stored enough hay to last all winter."<sup>3</sup> While many dairy farmers built newer, larger barns, hundreds of older, usually smaller ones, were remodeled to build in high drives. (Figure 2.) This remodeling included two important features:

1. The flooring of the high drive is just that, flooring, and not a structural replacement for the missing section of chord above.
2. The interior posts were tenoned into mortises in the bottom of the chord. Cutting the chord at this particular point either removed one entire side of the mortise or left only an inch or two of wood. There is no holding power in this arrangement. The chord was always cut at the edge of a post in order that the post serve to support the high drive.

Years prior to their collapse, these walls of these barns begin to lean outward, and splitting may occur in the tops of the posts from the unrestrained outward pressure of the loaded roof. The greater weight of baled hay leaning on the exterior walls became a contributing factor. The typical response to these symptoms has usually been the installation of a cable with turnbolts, or truss rods, across the width of the barn. These can be of great help, but since these are only strong in tension, the barn is not fully returned to its designed strength and rigidity. An equally common response has been the resignation that the old barn has had its day.

A barn can be properly framed internally to carry a high drive. (Figure 3.) A more sophisticated gambrel roofed barn built to carry a high drive provides more head room and reduces somewhat the length of timber

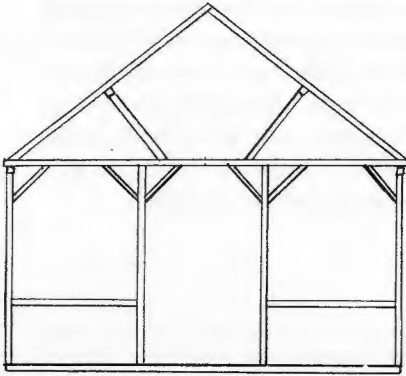


FIGURE 1

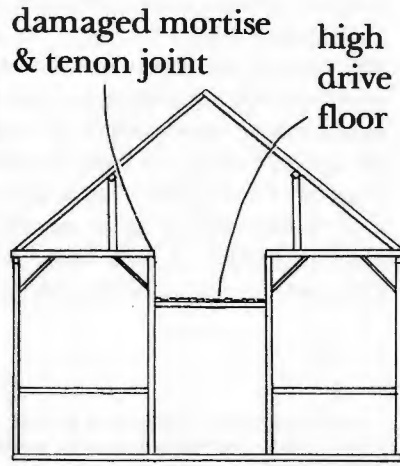


FIGURE 2

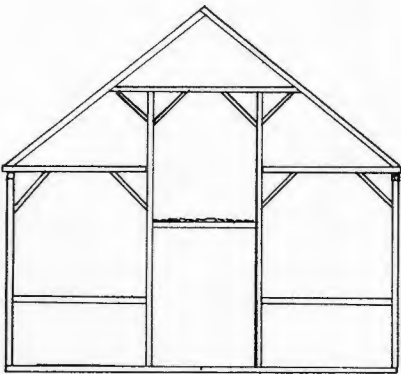


FIGURE 3

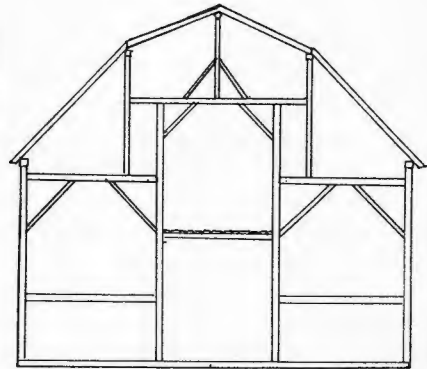


FIGURE 4

needed to build a barn of this height. (Figure 4. This barn is on the Clifford Winchester Farm in Stannard, Vt., and was built in 1918, making it among the later timber frame barns built in the state.)<sup>4</sup>

Vermont's legacy of barns, its most characteristic and monumental architecture, will continue, of course, to go the way of all flesh. However, some relatively inexpensive structural compensation for the induced flaw by remodeling to accommodate the high drive can greatly extend the lives of the affected barns. As these are usually the older barns, beautifully and massively framed, their loss is particularly tragic. Metal rods and plates, or a wooden reframing of the affected section, can be tailored to the particular frame of each barn. A problem remedied in time can give these early barns a useful life which can be measured in centuries.

#### NOTES

<sup>1</sup>In the nineteenth century horses provided the power for this overhead fork. In the twentieth century tractors, automobiles, and electric winches joined the horse in those barns that did not incorporate high drives.

<sup>2</sup>*A Long Deep Furrow* (Hanover, N.H.: University Press of New England, 1976), p. 440.

<sup>3</sup>*The Hill Country of Northern New England* (New York: Columbia University Press, 1936), p. 199.

<sup>4</sup>In the second half of the nineteenth century plans were widely publicized for improved, efficient, "vertically integrated" barns. See for example B. Halsted, ed. *Barns, Sheds, and Outbuildings*, (Brattleboro, Vt.: Stephen Greene Press, 1981).