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ROOFS FOR FARM BUILDINGS

Probably no feature in modern building construction varies more than the styles, shapes, and materials used in roof design. This variation includes innumerable types from the flat roof through the sloping and arched styles even to steep conical and pyramidal shapes. While any one of these may have peculiar advantages over the others, too often the preference is based upon style or custom.

HISTORY

Ever since the aborigines left their dark caves, there has been a continual change in roofs, generally for the better. There have been tents and tepees of hides or cloth with steep sloping roofs to shed water and snow. The sod huts with level roofs were not very suitable except in dry climates because of difficulty in repelling water. This led to the sloping roof and to thatching with branches, leaves, and tall grasses, which was a marked improvement. Later came the use of shakes and shingles supported by sloping rafters. Many of these are now used, such as shingles of cedar, asbestos-cement, sheet metal, asphalt, slate, and tile.

REQUIREMENTS

The size, shape, and other characteristics of a roof are influenced by a number of factors. Strength is probably the most important. It must support the dead load of the structure itself and the live load including snow and ice, and wind pressures. Of course, the purpose for which the building is intended may be the primary criterion, but strength cannot be neglected. The capacity may also be of great importance as in planning a barn roof to shelter a certain amount of hay. If the roof must positively shed water, its shape and slope are features which are considered in addition to the roof covering. A flat type of roof is difficult to make watertight, while the greater the pitch of the roof, the better it will repel water. Permanence may likewise require due consideration as certain types of roofs and roofing are inherently longer-lived than others. Then in practically every case, economy is important as the entrepreneur must balance the cost against the life of the structure.

ROOF TYPES

Modern practice in farm building construction has developed a number of

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common roof shapes. Some of these are shown in the illustration.

Shed Roof. This is sometimes called a "lean-to." The rafters are sloping,

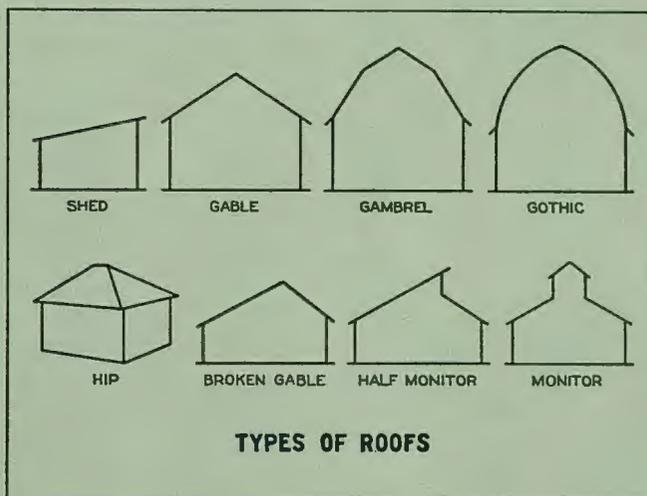
the ends of the ridge. The pitch is usually the same on all four sides, and when the building is square, the roof is pyramid-shaped. When the hip roof can be used, there is some saving in material and a decrease in capacity.

Gambrel. The gambrel roof is similar to the gable type with an extra break midway in the rafters. This allows for greater volume for storage, as in the hay-loft of a barn. It is also economical as shorter lumber can be used for the rafters. Each corner is braced and a collar beam placed just below the ridge. Water-shedding characteristics are good as greater slopes obtain where needed most. "Hip roof" is not the correct term for this shape.

Gothic. Made with two curved rafters to form a three hinged arch, this roof is self-supporting and really requires no bracing. It is shaped best to furnish ample storage space for hay and has a suitable ridge for a hay carrier track. The shape is naturally water-resistant and also wind-resistant due to its streamlined curves. Bent

rafters may be used such as 6-ply, 1" x 4" boards, well nailed, and bolted. They can also be glued together so that the rafter may act as a single unit and when thus well made, will never sag. Gothic rafters are sometimes sawed to shape using wider 1-inch boards on edge, and when four plies are staggered and well nailed together, provide a strong, reliable roof support. Lamella construction has excellent qualities of strength and stiffness. It has the Gothic or circular arch of varying rise and is built of 2-inch planks on edge bolted together forming a laminated, diamond shaped pattern, supported at the walls by tie rods, buttresses or piers.

Flat Roof. While formerly found to be leaky and troublesome, flat roofs have recently proved to be superior in many ways. Construction is simple, strength is secured by deep rafters, trusses, or reinforced concrete, and waterproofing is obtained by modern means such as roll-roofing, tar or asphalt, and gravel. Where attic space is not required and a tall steep roof is undesirable, considerable material, time, and expense can be saved by the flat roof. It need not be hot in summer for modern insulation just under the roof will modulate the temperature.



TYPES OF ROOFS

a feature that assists in shedding water. The span is usually rather short varying from ten to twenty feet as in a poultry house or garage. Wider spans are not desirable because deeper rafters would be required for adequate strength.

Gable Roof. The gable type of roof is simple, economical, and very common. It is stronger than the shed type and is used for wider spans. Each rafter spans only half of the structure and leans against its mate. Thus the lower ends of the rafters tend to spread apart and are restrained by a joist, collar beam, or tie rod. The pitch is computed by dividing the rise by the span, pitches in common use being $\frac{1}{4}$, $\frac{1}{3}$, or $\frac{1}{2}$.

The broken gable roof is an arrangement with unbalanced sides. With equal slopes on the two sides, the walls are unequal in height. Poultry, hogs, and machinery are frequently housed under this type of roof.

Monitor and half-monitor roofs have a combination of shed and gable features. The additional vertical walls are used principally to obtain better light but they also permit greater heat loss and are somewhat more difficult to construct.

Hip Roof. This term is applied to the gable type with corners cut off at