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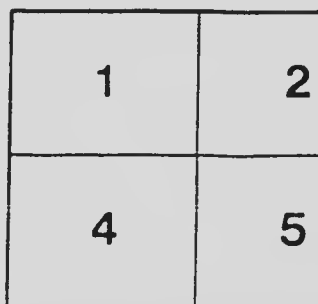
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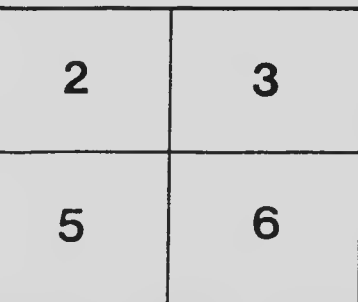
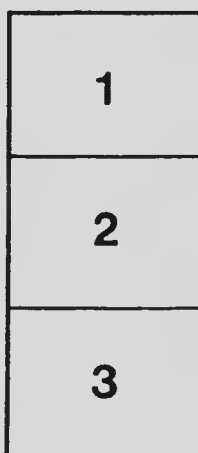
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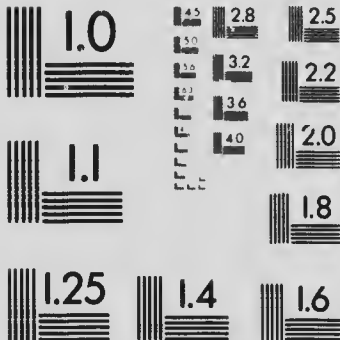
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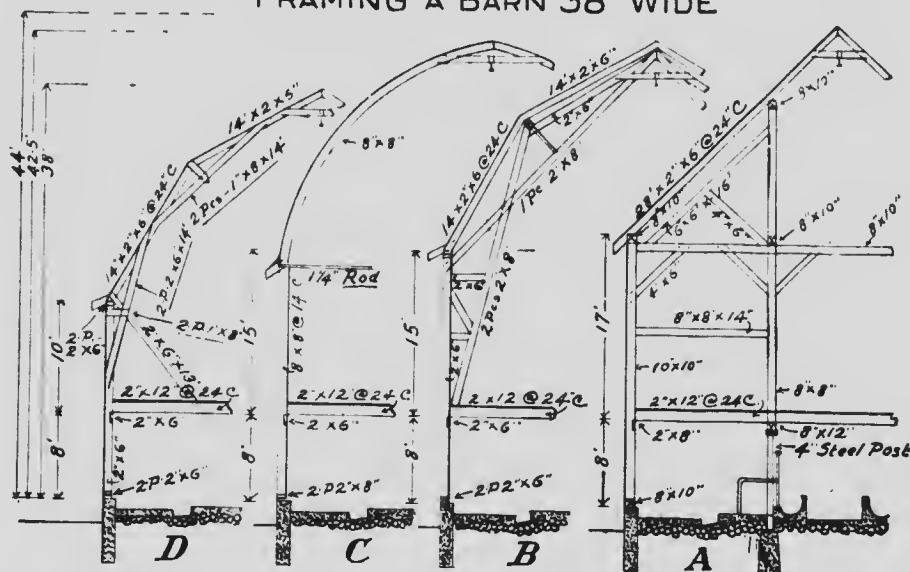
FRAMING THE BARN TRUSS

BY

E. S. ARCHIBALD, B.A., B.S.A., *Dominion Animal Husbandman.*

Many different types of barn frame are advocated in different districts and by different constructors. In this circular is given an illustration and brief description and specification of some of the commoner types, with some notes as to their utility. In the older sections of Canada it is usually the practice to have the foundation of the barn of stone or concrete up to the full height of the stable, and on which the sills,

FRAMING A BARN 38' WIDE



joists and the end of the posts rest. However, it may very often be found more economical and convenient to have the foundation projecting only 2 feet above the ground level and the walls of wood from this point to the joists and from joists to plate. Since this is optional, the specifications do not include the walls from the ground level to the ceiling of the stable. Since the joists, the beams supporting the

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joists, or the ribbon plate checked into the post supporting the end of the joist may be the same in all four structures herein described and illustrated, these are not included in the descriptions or specifications. The posts supporting the beams in the stable may be of either wood or steel. These, too, are not included. These descriptions and specifications do not include the framing of the ends of the barn, which conform to the type of truss in framing and are studded, braced and covered as the side walls.

Type "A"—Heavy Timber Frame.

At the present time heavy, squared timbers are scarce and expensive. This type of frame was very suitable in former years when timber was readily available and very cheap, and when labour also was cheap. It requires a great deal of skill and experience correctly to cut, mortise and tenon all the joints, and again, this frame is only as strong as the tenons and pins. In the plank frame structures described later the full strength of the lumber is retained in the splice. The timber frame requires more lumber and is no stronger than the plank frame type and as seen in later comparisons, there is a great deal less room in the former barn in proportion to the timber contained therein.

Following is a list of materials of the loft frame of a barn 38 feet in width, including one truss and the framing of 14 lineal feet of the barn to the next truss:—

	Board Feet
Wall posts—2 pieces, 17 ft. by 10 in. by 10 in.	284
Centre posts—2 pieces, 29 ft. by 8 in. by 8 in.	309
Wall studs—8 pieces, 17 ft. by 4 in. by 4 in.	182
Cross girt—38 ft. by 8 in. by 10 in.	254
Cross girts—2 pieces, 14 ft. by 8 in. by 8 in.	150
Lineal girts—2 pieces, 14 ft. by 8 in. by 10 in.	188
Plate—2 pieces, 14 ft. by 8 in. by 10 in.	188
Purlie plate—2 pieces, 14 ft. by 8 in. by 10 in.	188
Braces—2 pieces, 16 ft. by 6 in. by 6 in.	96
Wall braces—80 ft. by 4 in. by 6 in.	160
Props—8 pieces, 4 in. by 6 in.	100
Rafters—16 pieces, 28 ft. by 2 in. by 4 in.	448
Collar beams—8 pieces, 6 ft. by 2 in. by 6 in.	48
Total lumber.	2,595

Full hay capacity of 14 lineal feet of mow. 23.2 tons

Lumber for frame of loft (end not included) per ton capacity. 103 B.F.

The hay capacity is figured on 500 cubic feet per ton. This is proportionately diminished by the interfering posts, braces, girts, etc., in any type of structure. Attention is again called to the fact that this lumber is generally scarce and expensive.

Plank Frames.

With the scarcity of lumber and, particularly, dimensioned timbers, necessity has taught the farmer the possibility of making strong barns with 2-inch plank. The plank frame barns are usually hip-roofed. This is fully as pleasing a structure in appearance and has greater capacity and utility, there being no posts in the barn floor to interfere with the free movement of materials, horses, implements, or men. In the three plank frames herein described all the frames are made of plank and board 1 and 2 inches thick and from 4 to 12 inches in width. This includes all the frame

of the building. No mortises or tenons are required; hence there is greater economy in building, less experience is necessary, and there is no weakening of the full strength of the lumber used. Generally speaking, much less lumber is required than in the timber frame and as strong a building is obtained. The weight of the roof is carried altogether to the side walls at joists. The steeper slope of the lower rafters with the hip roof gives greater water-shedding power, hence greater durability to the covering of the roof. Good, sound planks properly bolted and spiked together are all that is necessary to make a first-class frame.

Type "B"—Plank Truss and Frame.

In this type there is a truss at every 10, 12 or 14 feet, as desired. Between these trusses 2 by 6 studding for the walls is erected at 24-inch centres. Two-inch plank is used throughout, both in the truss, posts, studs, rafters and braces. This is a very strong truss, very suitable for walls sufficiently high to allow a doorway 14 feet in height to the loft floor. The base of the truss (the bottom of the purlin prop) is spiked to a joist which in turn is resting on the 2 by 6 ribbon plate set into and spiked to the post under the joist. The truss should be well bolted at the splice of the purlin prop and peak prop, elsewhere should be thoroughly spiked. As a rule, the truss is made on the flat and hoisted to position by the use of a gin-pole. The end frame is erected first and the intermediate trusses herein illustrated are then hoisted into position. The walls are then braced diagonally and boarded in, after which the purlin plate, rafters and roof covering are added.

List of materials of loft frame, including one truss and 14 lineal feet of the barn to the next truss:—

	Board Feet
Posts—4 pieces, 15 ft. by 2 in. by 6 in.	66
Plates—2-ply (2 by 6), 56 ft. by 2 in. by 6 in.	56
Purlin plate—2-ply (2 by 6), spaced 2 inches apart to receive prop—56 ft. by 2 in. by 6 in.	56
Purlin props—4 pieces, 28 ft. by 2 in. by 8 in.	158
Peak props—2 pieces, 28 ft. by 2 in. by 8 in.	79
Truss braces—80 ft. by 2 in. by 6 in.	80
Wall studs at 24-inch centres—12 pieces, 15 ft. by 2 in. by 6 in.	180
Rafters (14-foot lengths)—32 pieces, 2 in. by 6 in.	118
Collar beams—8 pieces, 8 ft. by 2 in. by 6 in.	64
Total number.	1,181
Full hay capacity of 14 lineal feet of mow.	26.1 tons
Lumber for frame of loft (and not included), per ton capacity.	45 B.F.

Type "C"—Gothic Truss.

This truss is made from 2 by 8 plank cut with the desired curve and thoroughly spiked and bolted together in four thicknesses, thus making a solid 8 by 8 continuous truss. This truss is continuous from the foundation to the peak. There are no props, plates or purlins. These trusses are placed at 14-foot centres. The space between these trusses is filled with studs continuous to the peak, made from 2 by 8 plank. The outside of walls and roof is usually strapped with 2 by 4 or 2 by 6 plank, with the necessary diagonal braces at the ends of the barn. A 1½-inch steel guy rod with turnbuckle in the centre is the only brace which each truss has. In making this truss there is a large amount of waste in cutting the segments for the proper curve. Expert

carpenters are needed, as it requires very careful work. This barn has only slightly more storage room than type "B" and, as a rule, in the hands of the average constructors the framing is more expensive and not as strong as type "B." Although this type of framing is very pleasing and is preferred by some, yet it is not generally recommended to farmers.

Type "D"—Self-Supporting Roof.

In this type of framing there is no special truss, nor are there any purlin plates. Consequently each stud and rafter, placed at 24-inch centres, must form a truss in itself. Each joist must be spiked to the wall stud, but it will be found advisable to set in a 2 by 6 ribbon plate to help carry the end of joist. This type of framing in narrow barns and in barns where only a short wall post is needed in the loft may be found cheaper than type "B," but should not be used in barns over 40 feet in width. In barns less than 36 feet in width and with a wall post not exceeding 7 feet in loft, a part of the bracing herein illustrated may be dispensed with and the barn still be sufficiently strong. However, experience has shown that in order to make a durable structure and guard against high winds and weight of snow that the method of structure herein described is necessary. One advantage of this type of structure over type "B" is that shorter, standard-length materials may be used. However, in a barn 38 feet in width more actual lumber is required in type "D," the frame is not as strong and the diagonal brace from joist to lower end of rafter above plate at 24-inch centres seriously detracts from the capacity of the barn. It must be remembered that it is essential that each stud and pair of rafters be made into a complete truss in order to support this roof, as no purlins or purlin props are included.

List of Materials of Loft Frame, including 14 Lined Feet of the Barn.

	Board Feet
Wall studs—16 pieces, 19 ft. by 2 in. by 6 in.	160
Plates (2-ply, 2 by 6)—56 ft. by 2 in. by 6 in.	56
Rafters—32 pieces, 14 ft. by 2 in. by 6 in.	448
Plate tie—16 pieces, 13 ft. by 2 in. by 6 in.	208
Lower rafter props—32 pieces, 14 ft. by 2 in. by 6 in.	448
Upper rafter props—32 pieces, 14 ft. by 1 in. by 8 in.	299
Collar beams—8 pieces, 8 ft. by 1 in. by 8 in.	43
Short braces (at plate and hip)—130 ft. by 1 in. by 8 in.	87
Total lumber.	1,749
Full hay capacity of 14 lined feet of loft.	20 tons
Lumber for frame of loft (end not included), per ton capacity.	87 B.F.



