Determining Tonnage of Stacked Hay

THREE types of stack are common in New Zealand:—

1. Rectangular with ridged roof.
2. Rectangular with rounded roof sloping away at one end.
3. Round with conical roof.

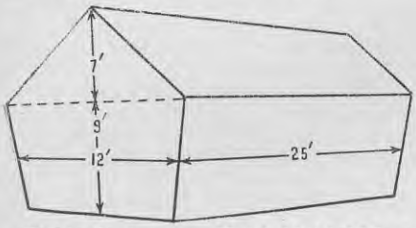
To estimate the cubic capacity of 1: Measure the length and width of the stack in feet half-way between ground and eaves. Now measure the height from ground to eaves and add half the height from eaves to ridge. The product of these figures is the cubic footage of the stack.

Example:

Length of stack between ground and eaves = 25ft.

Width of stack between ground and eaves = 12ft.

Height of stack between ground and eaves = 9ft. plus half height of eave to ridge (3ft. 6in.) = 12ft. 6in.



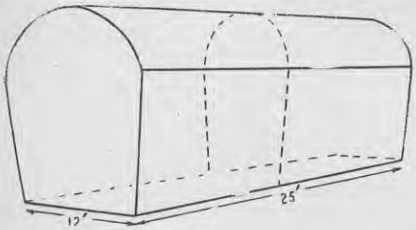
Cubic footage = 25 × 12 × 12.5 = 3,750 cub. ft.

Tonnage mature hay at 300 cub. ft. per ton = $\frac{3,750}{300}$ = 12½ tons.

To estimate the cubic capacity of 2: Measure the "over" from the base at one side to the base the other side of the stack midway between the two ends, then measure the length and width. A formula is now used to obtain a factor which is multiplied together by length and width.

Example:

Over midway along length of stack 35ft. Width 12ft. Length 25ft.



To obtain factor:

(a) Multiply over by .52 = 35 × .52 = 18.2.

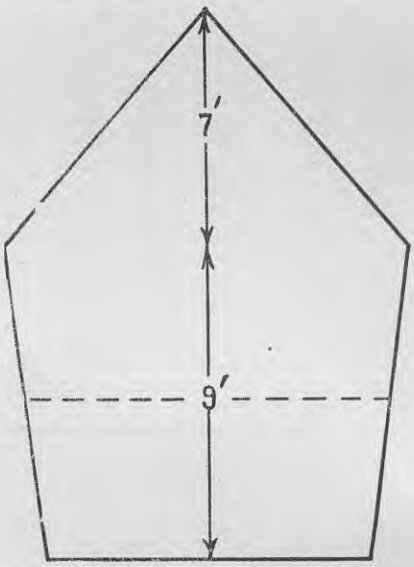
(b) Multiply width by .45 = 12 × .45 = 5.4.

Subtract (b) from (a) = 18.2 — 5.4 = 12.8.

Now multiply width × length × factor = 12 × 25 × 12.8.
= 3,840 cub. ft.

Tonnage mature hay at 300 cub. ft. per ton = $\frac{3,840}{300}$ = 12⅘ tons.

To estimate the cubic capacity of 3: Measure the circumference of the stack half-way between eaves and ground, square this, multiply by .08, and the height from ground to eaves. This is the cubic capacity of the body of the stack. The top is reckoned as follows: Circumference at eaves squared × .08 × $\frac{1}{3}$ height eave to peak. Add the cubic footage of the body and conical top to obtain the total cubic content of the stack.



Example:

Cubic capacity of body of stack: (Circumference squared × .08 × height ground to eaves)

$\frac{38}{1} \times \frac{38}{1} \times \frac{.08}{1} \times \frac{9}{1}$ = 1,039.7 cub. ft.

Cubic capacity conical top of stack:

(Circumference squared × .08 × $\frac{1}{3}$ height eave to peak)

$\frac{42}{1} \times \frac{42}{1} \times \frac{.08}{1} \times \frac{7}{3}$ = 329.3 cub. ft.

Total cubic content of stack (base plus top) 1,039.7 plus 329.3 = 1,369 cub. ft.

Quantity oats at 350 cub. ft. per ton = $\frac{1.369}{350}$ = 3.9 tons.

Estimation of Tonnage

Having obtained the cubic footage of any haystack the tonnage is reckoned by dividing the cubic footage by the number of cubic feet of hay to the ton. The number of cubic feet of hay per ton is very variable and depends among other things on the length of time the hay has been in stack. One authority states that for lucerne 512 cub. ft. per ton is normal after 2-3 months in stack, this decreasing to 440 cub. ft. per ton after 10 months. Other references for grass hay give a figure of 350 cub. ft. per ton for old hay, 400 for new hay, and 300 for sheaf hay. For the cereals Algerian oats after one month's stacking are estimated at 350 cub. ft. per ton, and after 9 months 250-280 cub. ft. Wheat and shotty-headed oaten straw are reckoned 10-15 per cent less than the above figures.

Determining Tonnage of Silage

Silage is commonly either pitted or stacked. The pit may be circular, square, or in the form of a trench, though the circular form is usual because for any given volume ensiled this offers less surface space and consequently the likelihood of less wastage. Stacks are nearly always circular for the same reason. The cubic footage of circular stacks or pits is estimated by multiplying the area of the end by the height, or if tapered the diameter is taken half-way between base and top to compute the end area, and this multiplied by the height. The cubic content of square pits = length × breadth × height.

As with hay the weight of silage per cubic foot is very variable, depending on the crop ensiled, size of silo, packing, etc. From various tables an average figure for well-settled silage is 50 cub. ft. per ton. This figure may be decreased by up to 5 cub. ft. per ton for the largest stacks and silos.

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An outstanding summary of the appearance and uses of the grasses and clovers in the Dominion is given by S. H. Saxby in Bulletin No. 250, "Pasture Production in New Zealand," which is available at 1/- a copy (post free) from the nearest office of the Department of Agriculture. He discusses the different types of grassland with the management and seed mixture required for each. The top-dressing, harrowing, and topping of pastures, the making of hay and silage, the establishment of new pasture and many other important practical aspects of grassland management are dealt with in a clear and helpful manner.