899-13

SMALL SAWMILL IMPROVEMENT
PRACTICAL POINTERS TO FIELD AGENCIES

SHORT-CUT METHOD OF FINDING THE MINIMUM SIZED TREE THAT PAYS ITS WAY THROUGH SMALL SAWMILL OPERATIONS

Sawmill operators realize that losses may result from taking small trees, but as a rule they or local forest-extension agencies are not equipped to make the detailed study required to determine the minimum size of tree which pays its way. A short-cut method for obtaining the "break even" DBH for small mills is given here in which the mill and yard labor costs alone furnish the necessary information as to the influence of tree size on costs. The results obtained by this method agree fairly closely with those found by detailed mill-scale studies. All other costs are taken as a constant and added to the mill and yard labor costs by tree DBH's. The costs and values in dollars are then plotted against the DBH. The intersection of the total cost line with the total value line gives the "break even" point. (See example, page 3). This intersection will usually be found in the lower ten DBH classes milled so that mill labor costs and values need be determined only for the ten smaller DBH classes. Three men in four operating days can get the required time and cost information from which conclusions can be deduced in a few hours of office computations.

To apply this method in the field requires:

(1) The cost per M board feet, lumber tally, for stumpage.

(2) The average costs per M board feet exclusive of stumpage and mill labor costs.

(3) The milling and yard labor cost per M board feet by DBH's for the smaller DBH classes.

(4) The value per M board feet, lumber tally, by DBH classes for the series of sizes included in (3).

(1) To get the cost of stumpage:

(a) When timber is bought on a lumber tally basis, use the contract price per M board feet.

(b) When timber is bought on a lump sum basis, divide the purchase price by the estimated number of M board feet, lumber tally, which will be cut.

(c) When timber is bought on a log scale basis, go to the felling area of the major producer and mark on each log the tree DBH for all trees cut in the lower ten DBH classes. When these marked logs are scaled at the mill, record the total scale by DBH classes. If logs are graded, also record by grade. From this compute the total cost of the log scale footage in each DBH class. This total cost per DBH class divided by the lumber tally per DBH class gives the stumpage cost per M board feet lumber tally.

(2) The total costs, exclusive of stumpage and mill labor, will vary with the method of buying timber. If timber is bought on a lumber tally basis (1a) or on a lump sum basis (1b), the total costs include all logging, transportation, mill moving, maintenance, depreciation, taxes, selling, and supervision costs.

If timber is bought on a log scale basis at the mill (1c), total costs, excluding mill and yard labor, include mill moving, maintenance, depreciation, taxes, selling, and supervision.

These total costs are arrived at from records supplemented if necessary with estimates.

(3) To get the milling and yard labor cost per M board feet lumber tally by DBH classes:

One man at the felling area marks on each log the tree DBH from which it is cut for all trees cut in the lower ten DBH classes. No log diameters need to be taken.

One man at the mill gets the headsaw time required for each marked log. Starting time begins when the empty carriage stops to receive the log. It should be taken with a stop watch to the nearest 0.05 minute. The time for each log is recorded under its proper DBH class. This man should also get a record of all delays during paid time when not sawing for a period of several days. This delay time is totaled, and from it the percentage of nonproductive time is determined. The recorded total time for each DBH class is increased by the amount of this delay time.

A second man at the mill tallies and grades the product from each marked log, entering footage and grade under the DBH class of the tree from which the log was cut. The grades are those upon which the lumber is sold by the operator. If any quantity discount from the green tally is applied by the purchaser of the lumber, this must be applied to the tally credited to the mill.

The total time for each DBH class divided by the total tally for each DBH class gives milling time per M board feet for the respective DBH classes chosen. This information is plotted and converted to labor costs by charging the labor cost per hour of milling.

(4) To get the value per M board feet, lumber tally, multiply the footage in each grade within a DBH class by the value received for the respective grades, change to value per M board feet by dividing the total value within the DBH class by the amount in M board feet, and plot the series of values.

Using the labor cost per M board feet lumber tally as found in (3) as a base, add the stumpage value as found in (1) and the average cost exclusive of mill and yard labor cost found in (2) to build up a total cost curve for the smaller DBH classes chosen.

Transfer the values as read from the curve for corresponding DBH classes found in (4), and the intersection is taken as the "break even" DBH.

Theoretically, this method is open to criticism because all costs, except mill labor costs, are taken as a constant uninfluenced by tree size. In a check based upon more detailed logging and mill scale studies this method gave the same "break even" DBH in five instances, in ten instances it was one inch different, and in one instance two inches.

In using this method, distortion of the "break even" DBH will result from inaccurate analysis of costs other than mill and yard labor, inaccurate estimates of the lumber tally of standing timber (1b), and the omission of any logs marked for the sample. It is recommended only as a relatively cheap method of finding the "break even" DBH on small operations making rough lumber. Planer operations should not be included.

TYPICAL EXAMPLE OF COST AND VALUE CURVES

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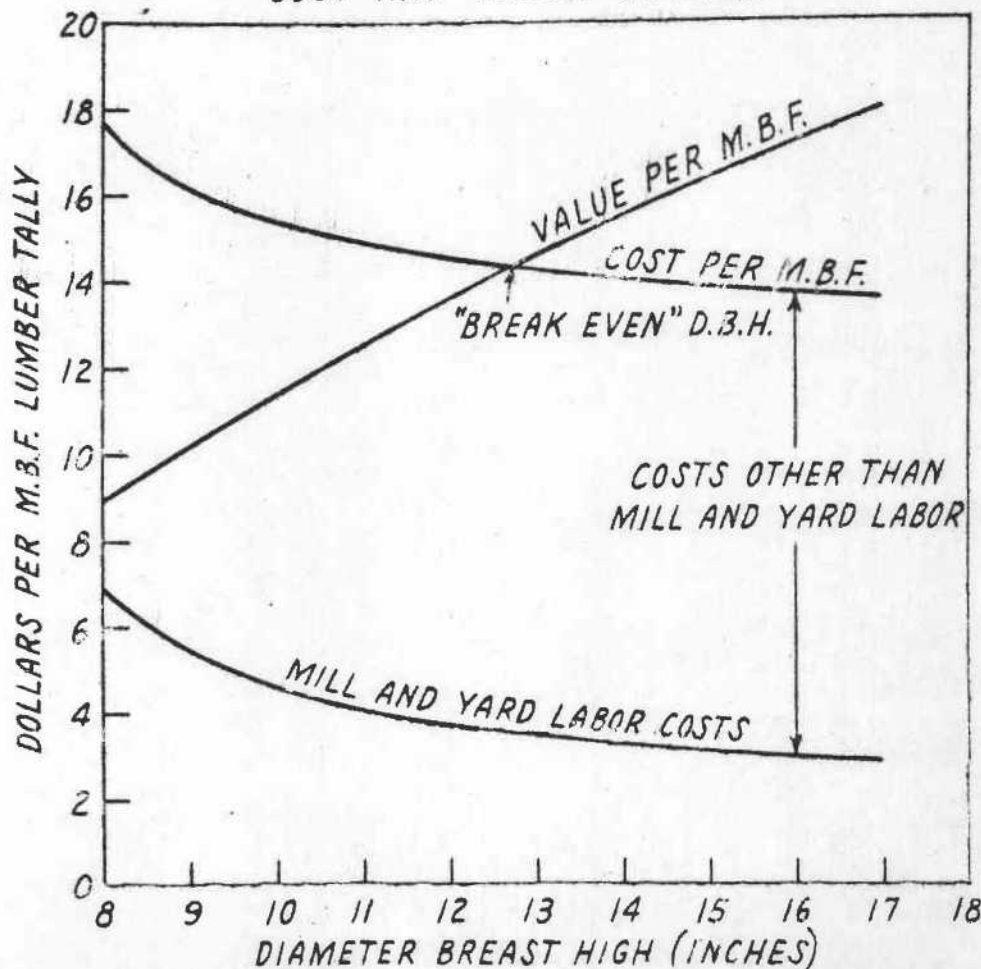
The following forms are suggested as guides in recording field data. A preview of the specific operation should be made and modifications in segregations incorporated to conform with the objective of getting data separated by the volume in each value group dealt in by the operator.

Form for 1(c)   Log Scale

Diameter breast high	Grade I	Grade II	Grade III
Inches			
9			
10			
11			
12			
etc.			

Prices per M board feet log scale:

Grade I_____Grade II_____Grade III_____

For each diameter class multiply the total log scale (M board feet) in each log grade by price paid per M board feet. The resultant total price paid divided by the footage (M board feet) for the DBH class in the lumber tally sheet is the value per M board feet lumber tally.

Form for milling time (3)

Diameter breast high	Sawing time required
Inches	
9	
10	
11	
12	
etc.	

Number of men in crew and wage per hour: _____
Delay time _____   Date _____
Interval covered or total time _____
Delay time within interval _____
Record to the nearest 0.05 minute the headsaw time required for each marked log in the DBH class from which the log originated.

SOFTWOOD TALLY SHEET

Width	Length	4/4-inch thickness					8/4-inch thickness			
		B & Btr.	No. 1C	No. 2C	No. 3C		B & Btr.	No. 1C	No. 2C	No. 3C
3	6									
	8									
	10									
	12									
	14									
	16									
4	6									
	8									
	10									
	14									
	16									
5	6									
	8									
	10									
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	14									
	16									
10	6									
	8									
	10									
	14									
	16									
12	6									
	8									
	10									
	14									
	16									

Diameter breast high, 9 inches

Use a separate sheet for each DBH class. Use the grade groups under which sales are made for the study operation. Based on these entries of number of pieces of specified thickness, width, and length compute footage in each grade, multiply the number of M board feet by the price received per M board feet for the grade, total resultant values for all grades, and divide by the number of M board feet in the DBH class to get value per M board feet for the DBH class.

HARDWOOD TALLY SHEET

Diameter breast high, 12 inches

Thickness	Surface measure by grade			
	F. A. S.	No. 1 Common	No. 2 Common	No. 3 Common

White Oak

4/4	:	:	:	:
6/4	:	:	:	:
8/4	:	:	:	:

Ties, timbers, and special items by grades and sizes.

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Red Oak

4/4	:	:	:	:
6/4	:	:	:	:
8/4	:	:	:	:

Ties, timbers, and special items by grades and sizes.

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Basswood

4/4	:	:	:	:
6/4	:	:	:	:
8/4	:	:	:	:

Special items by grades and sizes.

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Miscellaneous

4/4	:	:	:	:
6/4	:	:	:	:
8/4	:	:	:	:

Special items by grades and sizes.

Use a separate tally sheet for each DBH class. Use a hardwood lumber tally stick to get the surface measure and enter surface measure footage under proper division as to species, thickness, and grade. Hardwood lumber tally sticks are available that either show the actual surface feet or the surface feet discounted for drying shrinkage. Use the former. When lumber is sold green, use full tally; if sold dry, discount full tally. Convert surface measure as tallied to board foot measure and get composite value per M board feet as described for softwood.

Contributed by C. J. Telford,
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October 1940.