Make Log Yield Analysis Part of Your Daily Routine

by Jan Wiedenbeck, Jeff Palmer, and Robert Mayer

You haven't been conducting regular log yield studies because you don't have extra people to assign to the task.

Besides, you've been around sawmills your whole life and have an innate sense of how your logs are yielding relative to the price you paid for them. Right?

At the USDA Forest Service's hardwood marketing and utilization research lab in Princeton, WV, new tools have been developed to reduce the personnel and time burden associated with conducting sawmill studies. These tools include a guidebook on how to organize a sawmill study to obtain the information you need without disrupting your daily production routine and a program that can help you determine your true operating cost per minute and per thousand board feet.

While it is likely true that your sawmill experience gives you a good sense of log recovery rates, odds are that you could improve your log procurement and processing decisions if you knew more precisely how changes in the diameter, length, and grade of logs affected the profit obtained per thousand board feet (MBF) of logs sawn.

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THREE QUESTIONS

Consider the following three questions. If you answer "no" to any one of these, than you should give strong consideration to establishing a sawmill study routine at your mill:

Question: For every species that you process in your sawmill, do you know which logs earn you a profit? Log yield analysis will give you this answer.

Question: Do you know with certainty which logs are better processed on the headsaw versus the resaw, gang saw, or skragg saw? Log yield analysis will give you this answer too.

Question: Do all personnel with your company who make key decisions possess the same knowledge and decision-making skills that you do? Log yield analysis can give them the knowledge they need to make better procurement and processing decisions.

Ideally, the sawmill manager knows what he/she should pay for each sawlog and what profit to expect from each log of a given species, diameter, length, grade, and quality. In reality, sawmill managers seldom base sawlog prices on the log's profit potential. Rather, they tend to base raw material price on what they must pay to compete with those seeking the same material. In many cases, logs are processed at severe losses. In today's global economy, the opportunity cost associated with suboptimal utilization of raw material and mill resources is substantial. As a result, understanding the profit potential associated with different types of logs is critically important for sawmill survival.

Sawmillers wish everyday was a good day. But winter means frozen logs and air lines, sluggish hydraulics, and potential machinery breakdowns. Spring can bring mud, dirty or half frozen logs, or even a log shortage. Summer and autumn bring their limitations: lumber stain, reduced employee productivity, and absenteeism. Sawmill managers recognize the wide variation in productivity and profitability levels between good days and bad days. Good days witness high machine utilization, increased lumber production, optimal lumber grade retrieval, and profitability. Bad days usually entail considerable downtime and associated decreases in production, lumber grade, and profits. The sawmill manager takes the good with the bad, presses on, and hopes the composite net result is acceptable production and associated profitability.

An optimally performing sawmill has mostly good days, and profit on these days is enhanced by the processing of "good logs." Even on the best of days, a perceptive manager recognizes that certain "ideal" logs yield higher profits than "lesser" logs. The actual profitability associated with log inputs probably is not quantified but rather is based on an intuitive "gut" sense of profitability derived from experience. As with the ideal log, the lesser log's lumber product value is seldom quantified; rather it is based on experience – an innate understanding derived from thousands of observations. The manager of the optimally performing sawmill knows what he/she should pay and what profit to anticipate from each log of a given diameter, length, species, grade, cost, and quality.

Traditional mill studies capture data over an abbreviated time span of only a day or two. Instead, mill study data should be collected continuously so that the results reflect potential profitability for a broad range of operating conditions. Alternate study approaches and specific mill study jobs are described and tools are provided for conducting sawmill studies. The results of a continuous sawmill study will reflect conditions and profitability under all operating conditions and regimes. This is accomplished by tracking individual logs and correlating processing costs, profit (or loss) levels, lumber grades, and yields with specific logs. This can be done with minimal impact on personnel and material flow.

"Continuous sawmill study" does not imply a nonstop process. Rather, it implies that relatively small bits of critical log, processing, and lumber yield data are collected on a continuous basis as time and staffing permits. In other words, at one point, little or no study information might be gathered due to severe personnel or market pressures, but the process resumes when feasible. Because data are collected over a long period, they more closely reflect a broad range of physical, market, and personnel conditions.

There are six essential steps in conducting a successful sawmill recovery study:

- Log sample selection is conducted in such a way that information is gathered to fill existing knowledge (data) gaps or to address a specific resource question.
- Logs are scaled and graded consistently so that comparison of study results is meaningful.
- Logs are marked distinctively before they enter the sawmill so that they can be identified as they are sawn at the mill's major break-down centers.
- A method is established for tracking which boards were sawn from which study log or batch of study logs. This method typically requires marking individual boards.
- The size (surface area and thickness) and grade of each board must to be tallied along with the identification mark that associates the board with a particular log in the sample.
- Log and lumber data are entered into the computer program in a timely fashion (before it gets lost) and comparative analyses are run and interpreted on a regular basis.

EASY DOES IT STUDY APPROACHES

The two-person study team:

A CMS can be refined so that only one or two persons collect log and product data. The two-person team is most effective in a larger mill that utilizes a resaw and has adequate surge capacity on the resaw incoming cant deck. In such mills, the cants sawn from the test logs can be stored while the headsaw timing and flitch/board marking is taking place. The two-man team relies on the cooperation of other machine operators.

The off-species approach:

A log testing method that is less likely to produce "lost identity" tally errors is the off-species approach. Test logs are run individually over the course of the shift (e.g., five logs over 8 hours) with these logs being a different species than is being processed in the sawmill that day. Choosing the species to be processed after the next species changeover will facilitate lumber sorting. However, the species chosen must be easily distinguished from the one that is currently being processed in the mill. For example, on a day when red oak logs are being processed, choose yellow-poplar or hard maple rather than white oak for the test.

This type of test is remarkably simple. It begins with the log grader/scaler marking the ends of the day's test logs with numbers. When a test log reaches the debarker operator, he/she notes the number. At the end of the shift, the debarker operator will have listed the order in which all test logs entered the sawmill. No other marks need to be placed on the logs, cants, or lumber during processing.

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Timing the log's residency time at the headrig is the only special study task that needs to be conducted. When the lumber approaches the grader, he/she writes the tally on a unique tally sheet. At the end of the shift, the debarker operator's test log order-of-entry list can be matched with the headrig timings and grader tallies.

The first five logs approach:

Another approach is the first-five logs method, which has been used for several months by a sawmill in Vermont (Paul Frederick, Vermont Department of Forests, Parks & Recreation, 2004, pers. commun.). On the evening prior to startup, five logs are scaled, graded, tallied, and marked. They are placed on the infeed conveyor, passed through the debarker, and positioned so that they will be the first five logs sawn in the morning. Everyone in the mill knows to expect these logs so the likelihood that logs or lumber will be "lost" during the study is minimized. The green chain, edger, and trimsaw infeed conveyors were cleared at the end of the previous shift, so these boards move through the system quickly and directly. Because relatively few logs are being tracked, different colors of spray paint can be used on the logs and lumber.

ESTIMATING THE COST FACTOR IN THE PROFITABILITY EQUATION

A comprehensive Continuous Mill Study requires precise financial and operational information to accurately determine the mill's total operating cost. Operating costs include both fixed and variable costs. Mill managers are well aware that today's modern sawmill is a costly venture. In fact, operational costs are second only to the cost of raw material. Logs, the sawmill's principal raw material, can account for as much as 65 percent of the cost of goods (green lumber) sold.

Having accurate information on operating costs is necessary for calculating profitability levels among defined log classes. Fortunately, calculating a mill's operating cost is relatively easy using USDA Forest Service software entitled COST (Cost Of Sawing Timber 2005). COST is designed to calculate the per-minute cost of a specific sawmill operation. This value is then input into one of the available computer programs/spreadsheets which can be used to conduct comprehensive analysis of sawmill recovery, efficiency, and profitability per log.

When using COST, the user must gather and enter sawmill operational and cost information. The final analysis helps sawmill managers identify and solve potential problems before they become unmanageable. COST inputs can be adjusted so that users can explore the cost effects of operational and financial changes. A free copy of COST can be obtained at (304) 431-2700 or at *www.fs.fed.us/ne/princeton/.*

THROW AWAY YOUR CRYSTAL BALL

The continuous sawmill study allows you to make your decisions based on reliable, up-to-date production data rather than vague or out-dated information or hunches. Many useful relationships can be discovered through these studies including: breakeven sawlog price, overrun / underrun percentages for different log species, grades, and size classes, lumber recovery factor, lumber grade yield for each of your mill's log grades, profit per log and per MBF for your mill's log grades, sawing times per log and per MBF, conversion costs per log and per MBF., insight into the accuracy and composition of mill log grades, insight into the buying characteristics of log buyers and/or log producers, and insight into volume and grade yield from specific species or regions.

The full version of the above may be read at *www.nhla.com* under the Forest Resources tab, then under "Continuous Sawmill Studies."

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