

Industry Based Log Grading in the Appalachian Region

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Grading Logs from an Industry Perspective...

- The industry has evolved to an ad hoc log grading system that is based on scaling diameter, clear faces, and species.
- Nuances include admitting or excluding certain log lengths, end conditions, and position in tree, among others.
- This has necessarily led to a profusion of log grading approaches at hardwood mills.
- Difficult to compare apples to apples when looking at grades and prices among competing mills, buyers and sellers.

Importance of Log Grading

- Critical to mill profitability!
- Logs account for at least 54 percent of mill costs, according to the AHMI 2010 Sawmill and Production Cost Survey.
- Once the grade and price are set, it is difficult to recover from errors once the log gets to the headrig.
- As the log/lumber moves downstream in the mill, the ability to impact grade yields decreases proportionately.

Log Grading

“Grading on surface appearances does not always disclose deeply buried defects in a log, but the grades of lumber cut from near the surface of the log where defects are reasonably visible are the grades that determine the real value of the log.”

(Wollin and Vaughn, 1947)

A General Log Quality Characterization

Scaling Diameter	Clear Faces				
	Most	→	→	→	Least
Largest	Highest Grade	↘	↘	↘	↓
↓	↘	↘	↘	↘	↓
↓	↘	↘	↘	↘	↓
↓	↘	↘	↘	↘	↓
↓	↘	↘	↘	↘	↓
Smallest	→	→	→	→	Lowest Grade

Developing a Hardwood Log Grading System

- Must have a basis in current industry practice (all of the mills we sampled were grading logs based on these three criteria):
 1. Species
 2. Diameter
 3. Clear Faces
- Assume the Sawmill Objective is to maximize the proportion of higher grade lumber...that is, Select & Better lumber.
- This is a significant departure from the USFS log grading system, which focuses on Common and Better yields.

Developing a Hardwood Log Grading System

- Using the number of clear faces as the basis for grading logs strongly correlates to the lumber grade yield distribution and to a lesser extent the OR/UR.
- The number of log grades should be of a manageable number yet adequately cover the range of lumber grade yields
 - in this described grading system, five grades are used which allows for 0 to 4 clear faces as a basis for grade establishment.
- There could be more grades defined by a mill. It often depends on the market and customer interests.

Developing a Hardwood Log Grading System

- Defined system uses nine (9) diameter classes to represent the range of observed diameters
 - $\geq 17''$, 16'', 15'', 14'', 13'', 12'', 11'', 10'', and $< 10''$
- The grade designations for this system are:
 - Prime and Select
 - No. 1+ and No. 1
 - No. 2+ and No. 2
 - No. 3

Log Grading System & Classification Template

Scaling Diameter	Clear Faces				
	Four	Three	Two	One	None
$\geq 17''$					
16''					
15''					
14''					
13''					
12''					
11''					
10''					
$< 10''$					

Initial Hardwood Log Grading Table

Scaling Diameter	Clear Sides/Faces				
	4	3	2	1	0
≥17"	Prime	Select+	Select	No. 2+	No. 2
16"	Select+	No. 1+	No. 1	No. 2+	No. 3
15"	Select+	No. 1+	No. 2+	No. 2	No. 3
14"	Select	No. 1	No. 2+	No. 2	No. 3
13"	No. 1+	No. 2+	No. 2	No. 3	No. 3
12"	No. 2+	No. 2	No. 3	No. 3	No. 3
11"	No. 2+	No. 2	No. 3	No. 3	No. 3
≤10"	No. 3	No. 3	No. 3	No. 3	No. 3

Key Factors in Developing Log Pricing

- Log Cost – determined from the following:
 - Lumber Grade Yields – Based on log grades.
 - Overrun/Underrun – Based on log size (scaling) and the log rule used.
 - Sawing Cost – Mill specific (\$/mbf)
 - Lumber and Cant Pricing – from third party market reports.

Developing a Hardwood Log Grading System

- The one issue that the grading table does not incorporate is overrun/underrun.
- Because of the significant role OR/UR plays in the pricing of logs...how best to handle it?
- In the upcoming pricing spreadsheets, OR/UR is given equal consideration with grade yields, sawing cost, and product pricing.

Developing A Hardwood Log Grading System

- Relative log pricing between grades is strongly affected by overrun.
- The question is how to best handle the characterization of a log with a given grade and level of overrun.
- As an example, take a Prime Grade RO log > 17 inches DIB and 4 CF.
- Yield of Selects & Better grades are over 50 percent and Overrun is low.
- What is the effect on pricing?

Price Analysis of RO Prime Grade Logs

Log Pricing - Prime Grade Red Oak ($\geq 17''$ and 4 clear faces)

Based on yield data from 109 logs from various sawmills

All calculations based on 1000 bf of logs - Doyle Log Rule

Grade	% Yield	Lumber Prices \$/mbf	Yield with Overrun	Revenue
FAS	0.468	\$1,170.00	1166	\$ 637.98
F1F	0.120	\$1,160.00	1166	\$ 162.01
Select	0.007	\$1,150.00	1166	\$ 9.58
1 Com	0.161	\$870.00	1166	\$ 163.01
2a Com	0.084	\$560.00	1166	\$ 54.68
2b Com	0.001	\$250.00	1166	\$ 0.27
3a Com	0.034	\$500.00	1166	\$ 19.79
3b Com	0.037	\$200.00	1166	\$ 8.70
BG	0.011	\$200.00	1166	\$ 2.56
Cant	0.078	\$390.00	1166	\$ 35.40
	1.000			\$ 1,093.98

Total Sawn Footage =	21,266	bf
Sel & Btr Yield =	59.46	%
Overrun =	16.60	%
Sawing Cost =	\$200.00	/MBF
Breakeven Log Cost =	\$860.78	/MBF

Pricing Analysis of 13" 4 CF RO Grade 1 Log

Breakeven Log Pricing - Grade 1 Red Oak (13" and 4 clear faces)

Based on yield data from 28 logs from various sawmills.

All calculations based on 1000 bf of logs - Doyle Log Rule

Grade	% Yield	Lumber Prices \$/mbf	Yield with Overrun	Revenue
FAS	0.205	\$1,170.00	1526.5	\$ 365.80
F1F	0.134	\$1,160.00	1526.5	\$ 237.87
Select	0.005	\$1,150.00	1526.5	\$ 8.95
1 Com	0.193	\$870.00	1526.5	\$ 256.09
2a Com	0.092	\$560.00	1526.5	\$ 78.23
2b Com	0.000	\$250.00	1526.5	\$ -
3a Com	0.059	\$500.00	1526.5	\$ 44.75
3b Com	0.010	\$200.00	1526.5	\$ 3.11
BG	0.017	\$200.00	1526.5	\$ 5.14
Cant	0.286	\$390.00	1526.5	\$ 170.13
	1.000			\$ 1,170.06

Total Sawn Footage =	1,962	bf
Sel & Btr Yield =	34.42	%
Overrun =	52.65	%
Sawing Cost =	\$200.00	/MBF
Breakeven Log Cost =	\$864.76	/MBF

Questions?

appalachianhardwood.org/log-grading

