DEVELOPMENTS IN LOG-MAKING IN NEW ZEALAND

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ABSTRACT

Over the last 3 decades, log making in the New Zealand plantation forest industry has progressed from the production of 10-12 m preferred lengths, to lengths that are usually only 3-6 m today. This is in an industry that has otherwise essentially adapted western North American logging systems for over a century. In earlier times there was limited linkage between markets and woods merchandising; today the response to markets is much stronger. Management emphasizes audits based on comparisons between as-cut and expert, generally non-automated, solutions. Bucking decisions have been automated, but in many cases later de-automated. The location of the segmentation operation, once usually at the woods landing, was for a period moved to central processing yards at many operations. In recent years, most operators have opted to return merchandising to the woods landing, while others have retained or upgraded their processing yards. These changes have been driven by:

- changes in raw material characteristics,
- highly specific demands in log markets,
- changes in ownership of the resource,
- developments in processing technology,
- the development of optimizing technology for bucking decisions,
- environmental considerations,
- operational experience with new technologies,
- transportation options,
- the results of value audits, and
- not least by some cost surprises.

INTRODUCTION

Three decades ago, New Zealand radiata pine loggers primarily produced preferred lengths of 10-12 m, with some mills accepting random unmeasured lengths. Today, preferred lengths are typically in the 3-6 m range. Merchandising has shifted from the woods landing to central processing yards at many operations, then shifted back to the woods landing in recent years. Given that historically the New Zealand industry has adapted Pacific Northwest logging systems, it is instructive to examine why these changes have occurred, and whether there are any lessons for North American loggers.
To give context to this discussion, a brief description of New Zealand forest operations is in
order. Radiata pine is extensively grown in plantations, and is the primary species cut in that
country. These plantations have supported a substantial increase in production over recent
decades, from 9.5 million cu.m in 1980 to 20 million cu.m in 2008. Typically radiata pine is
clearcut at age 25 to 30, with a mean DBH between 500 and 700 mm. Usually it is skidded in
tree-length, and bucked at the woods landing into sawlog, peeler, pulp, and export sorts. Radiata
pine generally has coarse, persistent limbing, which the forester attempts to control through
genetic selection, pruning, and manipulation of stand density.

CHANGES IN THE LOGGING ENVIRONMENT

Changes in log-making practices—including bucking shorter lengths—have developed in
response to changes in industrial structure as well as physical changes in the nature of the
resource. These various changes are inter-related and a brief discussion follows.

Ownership

Just as in the US, there has been a radical change in ownership of the resource. At one time the
forest industry in New Zealand was vertically integrated, with common ownership of land,
timber, and conversion facilities. Today, ownership of land, timber and conversion facilities is
usually separated, with TIMOs (Timber Investment and Management Organizations) owning and
operating a large portion of the resource.

Market Responsiveness

There has also developed a far greater responsiveness between log merchandising and markets.
Paradoxically, the vertically-integrated operations of yesteryear had limited linkage between the
woods and the conversion facilities. There was little accountability for efficiency in raw material
allocation or usage, at any part of the supply chain. Today, it is common to see 12-20 different
log sorts on a single landing, just for the single species. Each sort responds to a specific market
niche.

This heightened responsiveness is coupled to a greatly increased specialization in log markets.
Today’s mills are highly specialized in the products they produce for their specific markets, and
in turn they demand a tightly-specified log.

The new ownership paradigm, where the timber owner typically does not own conversion
facilities, furthermore means that the logger is supplying multiple, highly specialized, markets,
instead of a single conversion complex as before.

Resource Characteristics

The resource itself has changed greatly. Until about 1980, most companies operated in forest
that had received little or no silviculture after planting. These stands were typically well-
stocked, limiting limb development. In the 1980s a transition occurred to a large percentage of
stands that had been intensively silvicultured. These tended stands were pruned to a height of 3
to 8 m, and thinned at an early age to maximize growth of the pruned trees. Such stands developed heavy limbing in the unpruned part of the tree, in response to the wider spacing and also in response to pruning. Furthermore, such a tree has much more taper than an unpruned tree. Therefore, there is a much greater value differential within a pruned tree than an unpruned tree. The first, pruned, log has high value, typically about $NZ130/cu.m delivered, since it produces a large proportion of clears. The second log may have a value only half this, as a low-grade export log for the Korean or Indian markets, because of the large knots.

To capture the value differential within a pruned tree, the logger must generally buck quite short lengths. Firstly, it is obligatory that he segment the pruned butt from the rest of the tree, resulting in a first cut of typically only 3-6 m. Then, the second cut is often heavily limbed and tapered, in response to thinning and pruning, so it, too, is likely to be a short length before a grade diameter break is reached. Very soon, while the limb size may fall off higher in the tree, taper mandates steadily falling diameters and therefore grades. Hence, log lengths are short, usually 6 m or less. This is exacerbated by the poor form exhibited by radiata pine that has not seen the most advanced genetic selection: crooks, sweep, forks and other defects abound, compared to many other coniferous species. The complexity of the decision-making is such that “log makers” are employed on every landing, to make merchandising decisions, marking cuts for the landing buckers.

CENTRAL PROCESSING YARDS

To merchandise over a dozen sorts, a tree-length landing must be large—if possible, at least 40 x 60 m. Even so, it is not unusual to skid to one landing while merchandising is in progress on another, alternating landings every few hours. To provide a safer, quieter, less obstructed merchandising environment, central processing yards became common in the 1990s. Stems were delimbed at the landing, then hauled to a processing yard that was located either remotely in the forest, or at an intermodal transportation transfer (e.g. road-rail), or at a conversion complex. At the yard, stems were merchandised and the resulting logs sorted, inventoried, and shipped to buyers.

Today, most of the remote yards have ceased to operate. They were more costly to operate than anticipated, especially when all of the associated incremental costs were included, such as for debris disposal, increased fire control (for spontaneous combustion in debris), and increased road pavement depth on some soils to carry off-highway axle loads. At the same time, value recovery did not improve as much as anticipated. Also, in some cases leachates contaminated adjacent streams.

More of the larger, more central processing yards, located at conversion facilities and/or transportation interfaces, have survived, being more economic.

Also contributing to the decline of the processing yard was the realization that log makers at the woods landing were actually doing a better job of merchandising than had been thought, as audit procedures improved. Additionally, the industry has improved its management protocols to enhance value recovery from merchandising at the woods landing.
WOODS PROCESSING TECHNOLOGY

Another cause of the reversion to merchandising at the woods landing has been improvement in processing technology, to the point where many managers feel increasingly comfortable with length measurements in particular, this being a critical issue in such a heavily-limbed species. With an excavator-mounted processing head, merchandising can be done more safely at the woods landing than by personnel on the ground. Mechanized processing has become standard in more densely-stocked stands where tree form is better, limbs are smaller, and piece size is smaller. However, not all managers yet feel comfortable with this method, especially where the wood is rougher and a larger piece size limits the economic advantage of mechanized processing; on these operations, motor-manual processing at the woods landing is the norm.

COMPUTER OPTIMIZATION

For several years, hand-held computers were widely used with software to optimize bucking decisions. This approach, too, has largely been abandoned. It was found that a trained log-maker could make a better decision, faster, than the computer. The software could not adequately take into account defects such as sweep and crook, for which the geometry is difficult to describe without actually scanning the log. Where stems were of sufficiently good form that the computer did make an accurate optimization, it was found that its solution was actually too good: technically correct, but resulting in an excessive volume at the very low end of each grade spec, which was not acceptable to buyers.

Many mechanized processors are equipped with optimizers, but these are often not used, as operators feel they can make a better decision, faster, than the computer.

Computerized optimization is successful at some of the large processing yards, where true 3-D scanning is employed and a truly optimal bucking solution is generated.

MANAGEMENT AND AUDITING

Managers typically generate a weekly cut plan for each side, based largely on contract logger projections, specifying the volume of each sort planned to be cut. Loggers usually cut very close to this plan. Also at typically weekly intervals, a cut card is generated for the use of log makers, showing the various log sorts in order of priority. Some managers assign a numerical weight to each priority. At one time this weight was the calculated stumpage yielded by that sort, but presently the weight is generated more arbitrarily, to reflect both the stumpage for that sort and also other criteria such as a shipping deadline or volume quota for the sort.

CONCLUSIONS

In summary, then, the New Zealanders have adapted their log-making practices to changes in the resource and in organizational structure. In the process, they discovered that central processing yards were successful in some situations, but not others, and the trend away from their use continues. After initially high expectations, they abandoned the attempt to automate the bucking
decision process, except in advanced, high-volume central processing yards, where it is successful.

What lessons can we infer for western North American operations?

Firstly, I do not intend to suggest that we should cut short logs as the Kiwis do. That decision is a function of their own resource characteristics and the other factors described above. However, we should always be open to revising bucking instructions in response to changing resources and markets; the decision algorithm must be dynamic. In particular, we need to be less tied to spurious solutions based on the idiosyncrasies of the Scribner scale.

Secondly, we can never let down our guard against the “garbage in/garbage out” syndrome. Technological advancement is critical to our success, but it must be implemented critically.

Thirdly, analysis must not be too simplistic or naïve. Many decisions to build central processing yards appear to have been made on the basis of simplistic, optimistic economic assumptions. We have long had the same problem in North America.

Lastly, it is essential to have a comprehensive knowledge of incremental costs and values. This is especially true in recovering biomass, which has an intrinsically low value, and where every opportunity to capture additional value and to control costs must be taken.