gement, and the appropriate tools and decision aids must be provided to the skidworker.

Locating the end of the pruned zone may be easier in the future because intensive, early thinning has been common since 1970s. Stands which have been so thinned have larger branches immediately above the pruned zone than those which have been held at a high stocking for the early period of their lives (i.e. most stands planted in 1940s and 1950s). Stands of the later type tend to have dead or suppressed branches for 3 to 6m above the pruned zone. It is this silvicultural treatment that leads to some of the problems associated with the correct recovery of pruned logs.

However it will still be many years before the wider-spaced stands come on stream, so we will be faced with the problems of pruned log identification for a considerable period of time. It is too risky to assume that we make an efficient recovery of the pruned material in our managed stands merely by instructing our skidworkers to cut pruned logs. We must identify what steps need to be taken to ensure that this premium material is recovered to its economic limit.

To determine where this economic limit lies will require communication with the downstream processing industries. Only by knowing what is the full cost of the errors made during log-making can decisions be made on how best to change the present allocation processes.

Recouping the pruning investment

A. Somerville

ABSTRACT

Over the last three decades in New Zealand around half a million hectares of Pinus radiata have been butt log pruned. This substantial investment has been supported by long-term regime evaluation exercises. In these exercises it has been assumed log prices would reflect both the clearwood content resulting from pruning and the likely premium paid for clearwood.

In today's markets, clear timber and veneer realize high prices. However good log quality definition is required before the buyer can pay a premium for pruned logs without incurring undue risk. When a pre-harvest quality definition is required and stand records are not available then it will be necessary to sample the pruned resource in a statistically valid manner. Sample logs will have to be sawn or cross-sectioned to reveal their internal characteristics.

A CASE FOR DESCRIBING PRUNED LOG QUALITY

An essential step in the selling of any unfamiliar commodity is a description of the constitution or quality of that commodity. This applies to the trading of pruned radiata logs.

In the period 1962-86 New Zealand's plantation forest estate increased by around 811,000 hectares (Ministry of Forestry, 1988). Additional to this investment has been a further massive investment in the thinning and pruning of much of these forests. For the State alone in the period 1962-85, there was 552,790 ha of pruning and 481,394 ha of thinning (New Zealand Forest Service, 1986). Silviculture was expected to pay off; as R. Fenton reported in the 1963 FRI Symposium, "The conclusion . . . is that tending (pruning and thinning) pays very handsomely indeed . . . tending will pay off, organisms permitting" (In Bunn, 1963).

Economic evaluation exercises of pruning regimes have invariably translated the likely high values for clear timber or veneer into high residual log values which are then assumed to be returned to the forest grower. In today's market environment, clear timber and veneer are certainly sought after and traded at a premium on domestic and export markets. It is the assumption that a high value for clears will translate into a high stumpage that is the weak link in the chain. One of the problems, of course, is that the results of pruning are internal and the potential range in quality is dramatic (e.g. from almost nil clears to 80% of sawn outturn in clears). So without a pruned log quality definition any premium the log buyer pays for pruning may be at risk.

Regime evaluations are usually long-term planning exercises. Since 1980 much research effort has been made in evolving sophisticated long-term planning models (Whiteside and Sutton, 1983, Kininmonth, 1987). However it is at the short-term marketing end where the money is made or lost and it is perhaps here that the effort should be greatest. Some forest growers feel they may be better off in selling poor quality pruned logs without a quality definition. This sort of trading threatens the seller's credibility and the buyer's viability. Inevitably, to eliminate undue risk the buyer will be tempted to pay only a small or nil margin for pruning. One mistake may put the buyer out of business. It could be likened to shopping at the supermarket for canned goods with all labels removed. If smoked oysters are sought but there is a likelihood of ending up with "dog's dinner" then the shopper may only be prepared to pay "dog's dinner" prices.

The problem of pruned log quality definition is not confined to log trading in either the domestic or export markets. Large forest growers with downstream processing options will be faced with optimal log allocation decision making. For instance, should pruned logs be allocated to a particular sawmill, a veneer mill, sold on domestic or export markets or left for a further period of growth? This sort of decision making requires good log quality definition.

If accurate silviculture records are available, then the problem is partly solved. These can provide some of the essential information necessary to define a stand's quality. Some further investigation may be warranted to check this predicted quality and provide additional information; for instance, to reveal the incidence of resin pockets or to determine likely veneer yield. Unfortunately for a large proportion of pruned stands nearing maturity at this time, these histories are either not available or are inadequate or inaccurate. Where pruned log quality definition is required prior to harvest, the remaining option for these stands is that of physically examining a sample of logs and determining their quality (Somerville et al, 1985).

In my opinion the following are the essential features of physically sampling and determining pruned log quality:

1. Sampling across the entire stand, i.e. not constrained by access, topography or stand condition.
2. Sample size and sample procedure should be statistically valid.
3. The important internal as well as external log properties of the pruned log should be quantified.

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4. Results should reflect the quality potential of pruned logs.
5. Results should be presented so that they are understood by all interested parties. For instance, log parameters, or further translation into potential sawing results for a sawmiller and potential peeling results for a veneer mill.

Point (4) requires further elaboration. Unless a mill's conversion performance can be somehow calibrated it is not sufficient to use actual grade and conversion results to define pruned log quality. Actual mill results are plant dependent. For instance, sawmill A can saw a truck load of pruned logs and obtain an overall conversion and grade outturn. Sawmill B can saw the same logs and obtain a very different result. Measures of inherent pruned log quality are required. Examples of these measures are: (i) the thickness of the clearwood zone; (ii) the diameter of the knotty zone; (iii) the translation of the measured log description via a prediction mechanism into a prediction of clears grades under a given set of processing assumptions. Detailed log description methods by Somerville (1985) and Park and Leman (1983) coupled with simulation models offer a solution in being able to reveal the potential of pruned logs.

Sampling stands and obtaining detailed log description is time-consuming, effort-requiring and costly work. Recent costs for the resource evaluation work carried out by The Forest Management and Resources Division of the FRI have ranged from 50-80 cents/m^3 of pruned logs in the resource (this work involves low intensity sampling and either cross-sectional analysis or mill study). The range in cost reflects the complexity of the resource and the information sought. Forest owners generally appear reluctant to spend money and effort on this work for marketing even when current stumpages for pruned logs range by as much as \$70/m^3. This attitude makes an odd contrast to the eagerness to spend such considerable effort and money in each of the silviculture operations.

A huge investment has been made by the private forest growers and taxpayers of New Zealand in our approximately half million hectares of pruned radiata pine. To recoup this investment pruned logs will have to be marketed as logs with a special intrinsic value associated with their clearwood content. This makes adequate log quality descriptions essential for pruned log allocation and trading.

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Maku Lotus for Forest Grazing

Maku lotus was bred at DSIR's Grasslands Division in Palmerston North, long before forest grazing was developed on a large scale. Back in the 1950s Grasslands Division's plant breeders thought that lotus might be useful on the steep, infertile banks between sheep tracks that make up the steps and stairs of the North Island's hill pastures. White clover grows in fertile tracks but lotus spreads through the steeper poorer patches.

Brought from overseas for developing pasture from native bush, lotus is an ideal pioneer legume, which entices livestock to graze weedy shrubland.

The plant breeders crossed well adapted New Zealand plants with winter-growing Portuguese plants, then doubled the chromosome number to produce faster-establishing selections. Maku lotus was the result and was released in 1975.

Release of Maku was timely. Grazing of Pampas grass in South Auckland forests, to prevent it from smothering young pine trees, needed a quality legume to enhance grazing value and attract cattle to graze among the trees. Its widespread use in forest grazing since then has amply demonstrated that it is the right tool for the job.

Maku lotus and radiata pine now work well alongside each other in a dual production system of timber and livestock which fits in well with today's economics – good production at lower costs.

Anyone complaining about the cost of Maku lotus seed (compared with grasses and clovers) should divide the cost by the number of years that Maku will perform and persist. Clearly Maku means good value for money.

In the higher rainfall areas of Eastern Australia, Maku is now regarded as a "magic" legume. It grows well with coarse tropical grasses, without any thirst for costly fertilizer, danger of bloat in grazing livestock, or loss by insect pests.

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