COMMENT

Editorial
Coming to terms with 'Quality'

The issue of wood quality, and in particular it seems the effects of decreasing harvest age on wood density, has become a popular topic for debate. Concerns have been raised in many quarters that hard-won foreign markets, or perhaps even our own captive domestic markets, are becoming disenchanted with the timber that they are being provided with from New Zealand producers because of reduced rotation ages. This in turn is predicted to cause buyers to seek out alternative suppliers rather than purchase from New Zealand.

The problem of declining quality, which is embodied in reduced rotation ages, is typically simplified to the faulty teachings of some misguided forest economist, or to the pressures applied by a money-hungry accountant in head office. The solution is then to have forest growers disregard financial or economic criteria in determining when a tree should be harvested and adopt a proper 'forestry' approach based on technical criteria. This would have trees kept firmly rooted to the ground until some magic age like 35, at which point their quality would be sufficient to allow them to be logged. In essence, quality would be guaranteed by ensuring that the decision on when to harvest is removed from the grower and instead determined by some external, 'objective' quality criteria.

Solutions generally flow from how a question is framed or structured, and a poorly-posed question will lead to inappropriate solutions. I am not yet convinced that we have asked the right questions so far to even analyse this issue, much less even be in a position where we can offer solutions. The simple focus on the grower and a single tree age to satisfy the quality problem appears as a crude solution to address a complex problem. The issue is first complicated by the fact that there is wood density variation for the same age around the country, density variation between trees within a stand, and density variation within the stem of a tree. Even a simplified focus on an age would have to be refined to reflect geographic differences.

The critical problem with this simplified view, though, is that older trees are not essential for a quality product. It is a fact that younger trees can be, and are, successfully turned into useful, problem-free products. So the problem cannot be simply that growers are harvesting younger trees. The rest of the production and distribution chain downstream of the forest is equally responsible for the proper processing of the log, treatment of the products and ultimately the quality of the final product. If there is a problem emerging in the form of reduced rotation ages, it would instead appear to be one of communication. Whatever measure of quality is being used by forest owners is evidently different from that being used by log users and this is the source of dissatisfaction. The main problem here is not a question of declining log quality, but rather a question of knowing what the quality characteristics are for the wood product you are considering purchasing, be it a log or a finished product. While quality is certainly an issue, the context in which it is being presented as a short-rotation problem is misguided. The key factor is instead knowing that what you are potentially going to process is a younger or less dense tree, and that you must both process and market the product accordingly.

'Market Failure'

What we have emerging, if we can use the jargon of economics, is a classic case of 'market failure'. Market failure refers to a situation where buyers and sellers hold faulty or incomplete information, causing them to make 'incorrect' decisions. It is not difficult to see how this might happen in a changing wood products market. If the experience of New Zealand radiata buyers has been with timber that is generally of an older age, and presumably a higher density, then their use of products and the prices they will be willing to pay for these will reflect this historical product performance. In other words, buyers are implicitly purchasing a range of embodied product characteristics, such as wood density, rather than just an object of particular dimensions. These buyers will only become dissatisfied when they do not get all the extra characteristics they thought they were paying for and the product does not do what was expected.

The so-called quality problem is not a problem as long as people know what they are buying and make choices accordingly. The crude solution to the problem, forcing all trees to remain unharvested until they reached 35 or whatever was deemed appropriate, now seems even cruder and more inappropriate. In other words, the wrong question has lead to an inappropriate solution. The lengthened rotation age solution does not address the real problem, which is how to allow the market to determine the relative values of older and younger timber when faced with a range of potential markets and processing options.

The main problems are twofold. On one side, the market is not sending the correct information to forest owners about the value that the market places on older, or higher-density wood. Forest owners see only aggregate, crude prices based largely on visual factors such as diameter and branch size, as the information on which to base their decisions. If higher density is of greater value, then growers should see a premium which pays them for holding the forest crop longer. If lower density is of lower value because of more expensive processing options, then growers should see a discount which also encourages them to hold the forest crop longer. On the other side, the market is also not allowing wood users or processors to discern the differences in wood quality that they are apparently really interested in.

What we need to recognise is that if there is a problem it is because the system we currently have to market wood is inadequate for the products we are now marketing. Taking this as the appropriate question, the solution is much different. In effect, the grading system needs to be more sophisticated, or at least different from what is currently used if it is not adequately reflecting important information. Sawmillers are just as much a part of the solution, and they too should have a financial incentive to cut for density if that is the quality measure that determines how they should be paid. What we need is more flexibility and complexity to our markets, rather than the reduced flexibility inherent in the forced lengthening of rotation ages.

Most importantly, we cannot escape the fact that a focus on arbitrarily extending the rotation age of plantations to create 'physical quality' in effect places no importance on a plantation being a com-

mercial crop, which ties up expensive capital. These forests are firstly a business's cash flow, part of an investment portfolio, or part of an individual's retirement plan. The 'quality' decision of a forest grower is not made in terms of physical quality per se, but rather in the way in which physical quality affects long-term profit maximisation. Forcing a grower to extend the rotation age simply penalises the grower by removing their profits and giving them to the processor, for whom life would become much simpler, allowing them to operate with less sophisticated technology and making their decisions less complicated. After many years of operating in markets which were stifled by State forest agencies and large corporates, forest growers can now make money growing trees. The last thing we need is to move back to some type of regulation to meet a 'quality' problem. A forest owner should quite rightly be able to make a decision to cut earlier and sell something of lower physical quality if it is more profitable.

In short, the quality problem is a communication and a market problem, not a grower problem. Everyone is in some way responsible for ensuring that quality concerns become part of the communication flow and thus part of the solution. The key is that we must ensure that the market keeps up with the information requirements that are necessary for 'quality' decisions. I have every confidence that the New Zealand forest industry is capable of adapting to this imperative without penalising forest growers by forcing some lengthened rotation.

Hugh Bigsby

Silviculture in New Zealand – A hundred years of change

Piers Maclaren and Leith Knowles

For perhaps 10,000 years, humans on five continents have practised agriculture. They have manipulated genetics, soil, water supply and weeds, to grow the most bountiful crops of the best quality. This contrasts with forestry, where in spite of historical, albeit localised, shortages of wood – with some exceptions people are only just progressing from the "hunter-gatherer" phase. Why is this?

For millennia, it has been known that the straightest trees grew at tight initial spacings. In these conditions, their tall, narrow, minimally tapered stems enabled them to reach the light before their competitors. Thinning by natural suppression of weaker trees also killed lower branches, which eventually decayed and allowed the formation of clearwood. The surviving, ancient trees often developed heartwood of great durability and outer growth rings of great strength. The reason that humans have not adapted their agricultural technology to forestry is one of economics: to duplicate this natural process using human effort required too great an investment upfront, and too long a delay to the payoff.

Some foresters are beginning to realise that, in order to meet economic criteria, wood must be grown in a way that is totally different from Nature's. Furthermore, in a world with a human population of six billion rising to 10 billion next century, natural forests will eventually not be able to supply enough wood. In the New Zealand context, far-sighted foresters reached these conclusions 84 years ago.

In New Zealand, the 1913 Royal Commission noted that exotic plantations would be required to replace the disappearing native forests. Which species should be planted, and how should they be grown? In a list of State plantings up to 1909, radiata pine ranked 18th, with only 110,000 trees planted. Nevertheless, its performance – in terms of both growth and wood utility – made it to the top of the list of Royal Commission recommendations. This was no doubt aided by a study published in 1914 of farm shelterbelts and plantations that had been utilised for house building in Canterbury (Cockayne, 1914), which concluded that radiata pine was "by far the most valuable and profitable timber tree that can be planted..."

Radiata pine was a fortunate discovery, but there were a few downsides. The species was not naturally durable, and it generated large branches, particularly if open grown. The clearwood was of excellent quality for many purposes, but the presence of knots – especially if they were large or bark-encased – downgraded the wood significantly.

High Stockings

High stockings could be used to control branch size. In order to suppress the lowest branches, however, very high initial stockings were required. In the first few years, trees are filling up the gaps, and branches do not become suppressed until they are underneath several metres of green crown. At 400 stems/ha, radiata pine branches do not die until they are 15-20 m below the tip of the tree. If branches 12 m from the ground are to be kept small, the spacings have to be tight until the stand is at least 20 m tall, and preferably taller. This has several negative implications.

First, it has been known since 1880s that the sapwood cross-sectional area at any point on a stem (i.e. the conducting tissue) is directly related to the branch basal area above that point (Jaccard, 1915). From this it may be concluded that you can't get smaller branches without a corresponding suppression of stem diameter growth. Tight stockings, therefore, involve sacrificing individual-tree volume for improved stem quality. To obtain trees of acceptable diameter at high stockings, it is necessary to have long rotations. And time is money.

Second, tight stockings are expensive. They cost a lot to plant, and to thin. Early this century, spacings of 1.8 m by 1.8 m were common, which equates to over 3000 stems/ha.

Third, the long series of production thinnings that are common in Europe and Australia are not very practical in the New Zealand context. Our steep and broken topography, high wind risk, and scarcity of markets for thinnings do not favour this approach. Although some production thinning is still employed in New Zealand, it usually occurs only once in a rotation – when the thinnings have accumulated a satisfactory volume but before the stand has reached a height at risk from windthrow. Production thinning is declining in popularity, and is currently implemented on only a quarter of the national estate.

One possibility, as Australian Max Jacobs realised in 1938, was to control branches by pruning (Jacobs, 1938). Instead of using trees as a tool to control other trees, pruning shears or saws could be employed. This would solve the problem of large branches in the butt log, and avoid the necessity of very high initial stockings. Jacobs' work was significant in that together with that of the South