



Payment Through The Head

Given all the data readily available from modern harvesters, why are we still buying and selling timber by the tonne?

Visitors to the Harvesting Demo were invited to a debate at the Queen's Hotel, Lockerbie, on the Thursday evening, where payment of contractors for what they cut, based on data from the harvester, was under discussion.

The harvester records every log, its length, diameter and volume. Surely this would form a comprehensive and reliable basis on which to pay the contractor for his machine's output? Well, apparently it's much more complicated than that.

The evening started with a presentation from Shaun Mochan of TreeMetrics, who said that the Forest Mensuration Handbook – the famous 'Blue Book' – was known to be inaccurate by a factor of 20–22%, a fact admitted recently by one of the current authors. So many factors come into play within a stand. There is a 35% variation relating to taper, straightness, branching *etc.*, and a 55% variation between stands using the same parameters.

However, harvester head data also includes anomalies. Firstly, the head may not be properly calibrated. Also, not all the produce cut ends up as logs, some going to waste. (On wet sites, timber can be needed under the brush mat to support the machine, for instance.) Waste is not always properly classified. Additionally, harvesters can record 'false trees', which are, in fact, merely logs.

Stem file data represents what is

actually cut, not the production file.

Cutting instructions are programmed into the harvester's computer – eight different selections on a Ponsse, for instance – but this varies. However, sometimes various factors are not made use of. Also, there is a trade-off between cutting to demand and cutting for value.

The performance of the harvester operator is a key factor, and is defined by such criteria as whether he is cutting to the agreed quality specifications, is keeping stump height low, and is avoiding excessive waste.

TreeMetrics offer software that uses complicated algorithms, painstakingly worked out and incorporated into computer code by young software programmers, said Shaun Mochan. It works very well. "We're grateful to them," he said.

Lasers are used to make a 3D pictorial view of the site, and cutting instructions are input into the system for each buyer. Each tree's diameter, sweep and length is recorded, and a diagrammatic representation of the forest can be displayed, with each tree already divided up into logs of various sizes, all colour coded based on the parameters set by the timber buyer.

This is of use to everyone concerned: anyone selling or buying the crop standing, the harvester operator, who knows exactly what he is working with and what he is expected to produce, and the sawmill, which knows exactly what to expect. The latter can even send out instructions at any point in the

harvesting operation to meet an urgent order.

All information on the site is stored on a secure website. Users can log on to view their own map, and data is linked to the harvester to create cutting instructions. TreeMetrics refer to this as real time forest intelligence (RTFI). It gives a live understanding of where the harvester is, every day, every week, every month, enabling stem file data to be extracted – counts, volumes, and average dbh. Average tree volume might prove to be 0.2 cubic metres on site as a whole, while 0.3 is what is actually being cut.

FC Scotland has been 'paying through the head' for a number of years now, and Neil Murray, Area Operations Manager, South Scotland, described how the system works.

Forest Enterprise Scotland measures in volume, he said, and is largely paid in volume, so why not pay contractors in volume?

Volume doesn't change; weight does. Payment by volume is therefore offered as an option on any new Direct Production harvesting contract. In South Scotland, the tender is made on a tonnage basis, then converted if the contractor wishes. This approach keeps the tender open to as many contractors as possible. The system does not apply to standing sales.

Key to success is proper calibration. Operators have to be trained in this, and calibration is carried out with tapes and callipers in agreed locations on coupe, at least every 2,000 cubic metres over bark felled, or monthly. The contractor provides calibration reports and harvester files, and checks are done on all the files that are presented.

Since through the head payments rely on the onboard computer, if it fails (or is stolen!), work has to stop! Of course, this also applies to other vital components of the harvester. Alternatively, the whole coupe could revert back to a tonnage payment system if necessary.

Contractors are encouraged to move to monthly invoicing, and payment terms are nett 30 days. Produce recorded as waste is not paid for, and FES carries out reconciliation checks at the end of the site. Any significant discrepancies are investigated.

Advantages of the system include the fact that the system is relatively simple to apply and administer, guarantees prompt payment, and essentially insures contractors against what they can't control (*ie*

delays in dispatch). There are no payment disputes, and FES's experience indicates there is a financial advantage, with lower contract prices.

On the down side, there are machine-specific challenges, and some investment is required by the contractor.

Validation of volumes can be challenging, and the use of standard conversion factors might need review. The Blue Book is not always applicable – for instance, when dealing with windblown Sitka that has been down for a long time.

Also, calibration checks need pre-planning, and FC staff have to be available at this time.

Brendan Burns was the next speaker, declaring he was voicing the opinions of contractors.

Speaking of the timber industry at large, he said that, with regard to payment through the head, a lot want it, but a lot are scared of it. "We're in an industry that spends a lot on very expensive equipment, and we're not using it." He wondered why not, since we all want to produce a better product.

He told us that all of us, as we get older, could look forward to the day when we have a robot maid-servant around the house. "It's amazing what they can do!" he noted with enthusiasm.

He had seen robots at work in Germany just a few days ago. They will be coming into forestry soon. They could easily carry out harvesting tasks, and this might be quite necessary given how few people are coming into the industry.

Brendan Burns quoted a number of reasons given to the FCA by a leading forestry management company as to why payment through the head is not desirable or even viable.

- According to them there are no examples of slow uplifts of roadside timber. Weight loss caused by wood drying out at roadside therefore does not happen!
- Measurement through the harvesting head does not offer the same transparency and security, and is not independently audited.
- There is no universally accepted and controlled system which all parties can sign up to regarding settlement based on harvester head measurements.
- Hauliers want to be paid by the tonne.
- Weighbridge measurement is best.
- There are too many conflicting



The speakers (left to right): Brendan Burns, Shaun Mochan, Simon Oldham and Neil Murray.

systems. Against this, Brendan Burns listed a number of plus points, including the fact that the contractor gets paid for the work actually done, cash flow is predictable, with a reduction in bank charges, jobs are easier to cost, and site security (timber theft) remains the estate's responsibility, not the contractor's.

He too saw a few obstacles to be overcome, including:

- Machines with old computer systems will have to be updated.
- Machine operators would need retraining.
- Heads have to be regularly recalibrated, and must be ready for random inspections.

All in all, Brendan Burns concluded that through the head payment was an opportunity to improve efficiency, reduce costs and reduce charges to customers.

"At the moment we are running on guesswork," he said. "Some are good at it, but it's still guesswork."

Simon Oldham, operations director of Scottish Woodlands, kicked off his contribution to the debate with a picture that was all too familiar to the contractors in the audience. It showed stacks of timber at roadside drying out in the summer sun.

As he said: "We produce timber as a volume commodity, but sell it by the tonne. Here we see a sunny day, and the contractor and the grower are both unhappy." He added that this is less of a concern under current, buoyant market conditions.

He said he was keen to see some sort of volume measurement, but added that he could explain why we compromise round a different measurement system, for some good reasons.

He nevertheless added that there were some inherent problems with weight measurement – moisture content, variation of density between species, site variation and

inconsistencies within a site (top of the hill, bottom of the valley). All in all, measurement by tonnage as currently carried out provides only a very crude approximation of timber volume.

There have been all sorts of measurement systems in the past, said Simon Oldham, referring to some historical measurement tables relating to Scots pine. These showed volumes in hoppus feet over bark for

trees of twenty to thirty feet in height with a breast high quarter girth from 2¼ to 7¾ inches. "I didn't understand it then; I don't understand it now," admitted Simon Oldham – a confession that struck a chord with several in the audience.

"But the volumes being traded are huge by comparison now. The higher inherent value of timber in the old days meant we could afford to measure it in this manner."

So, where to measure? On the stand? That's not what goes into the processor's yard. Through the head? We can get a lot of data, but the head needs to be calibrated and the calibration must be independently verified. If we are harvesting 10 million tonnes, with 600 harvesters working full time, that is a big task.

The conventional system for selling is pounds sterling per tonne, which limits room for manoeuvre as to who takes the risk if changing units of measurement.

If we are stuck with a tonnage price for the grower, then tonnage will have to be accepted by the contractor and the haulier. It would be a better system if we had the same unit throughout – and hauliers want to be paid by the tonne.

Alternatively, stacks could be measured at roadside. Some would be easy to measure, some would be impossible – this last point being illustrated by a higgledy-piggledy pile of logs that had been scattered on top of each other rather than stacked (a rather extreme example).

The Swedes have invested in measuring at the sawmill. Independent measuring associations are employed, and trained measurers sit in their own shed at the front of the yard using increasingly sophisticated equipment – but they don't come free.

Alternatively, lasers and cameras can measure stacks on lorries as they drive through a shed. It would be easy to underestimate the cost, however.

Fans of measurement by volume must concede that the weighbridge is cheap, regulated, fast and reliable – and we all understand it.

"We need an independent system that doesn't cost too much compared to the value of the product," Simon Oldham concluded.

A lively debate ensued, with all sides of the industry represented in the audience. We'll attempt to give a flavour of this here, and, if apparently disjointed, the account will nevertheless reflect the nature of

the debate, with interjections from all sides.

John Paterson of Egger said it was the norm in Scandinavia to recalibrate the head once a week – a quick and easy operation that required some training, and of course some investment in equipment. Recalibration was also carried out when moving onto a new crop, because the head would begin to behave differently.

If payment through the head became the norm, calibration would have to be carried out by an independent body. At the moment it is only carried out once an agreement has been reached between buyer and seller.

Next, it was pointed out that the Commission might well be happy with payment through the head because they are a grower of timber. Most growers would be very happy with payment by volume.

"If everyone accepts volume, then fine, but a lot of sawmills don't have the technology," was the next comment.

David Leslie of James Jones, who made it clear that he was not in favour of any change, asked whether sawmills should measure under bark, over bark, before reducing or after reducing.

"Why would a forest owner be afraid of the volume system?" Donald Maclean, chairman of the Forestry Contracting Association, wanted to know.

Neil Murray said the system was simple. "Embrace it if you want to."

James Jones were then offered the opportunity of trialling the TreeMetrics system.

John Paterson said the Swedes experience regular on-site visits, and they have sawmill systems that photograph each log.

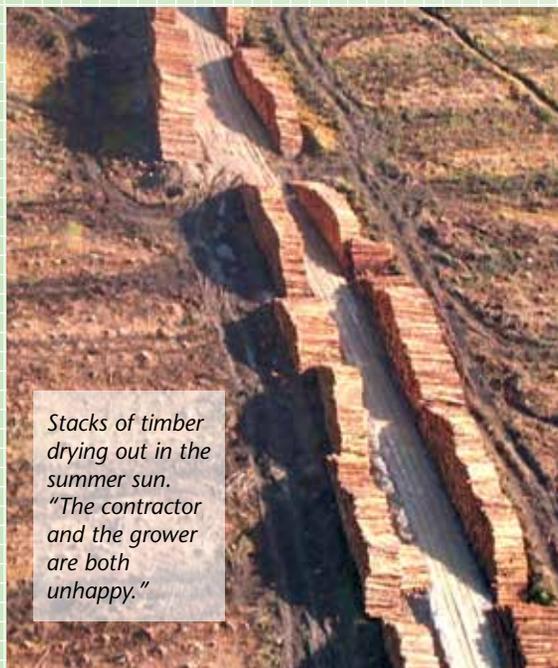
"Expensive?" queried Brendan Burns. "Think what the contractor has invested!"

"Complicated," countered John Paterson.

"The FC predicted that purpose-built machines wouldn't last, because they are so expensive," noted Donald Maclean.

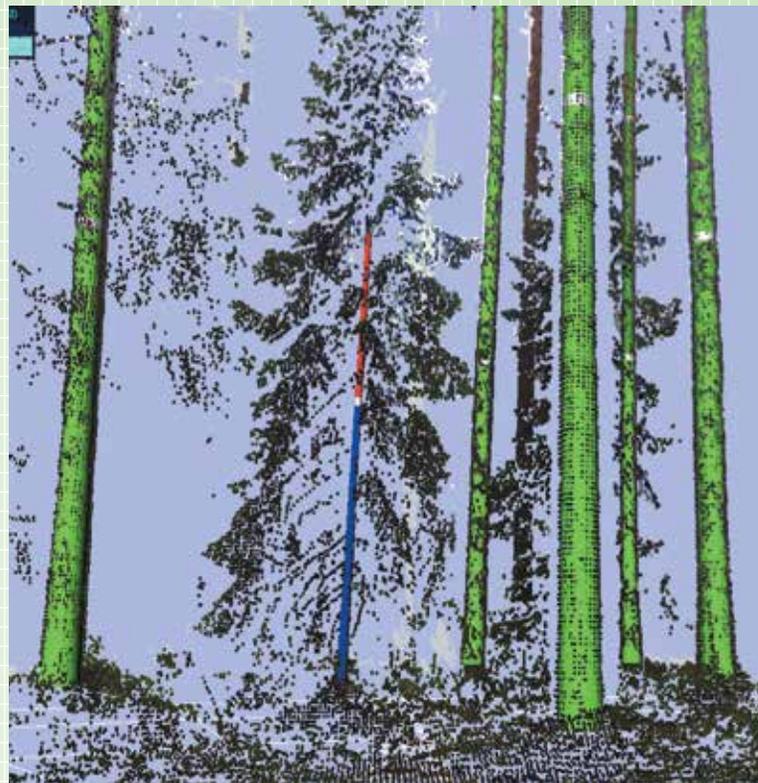
Tom Powell told the story of a Danish faller he once worked for. Volume was measured by submerging logs and seeing how much water they displaced.

One contractor from Ireland pointed out that, whilst the harvester could give a measure of volume, there was no way of rewarding the operator who was working hard to maximise the value of the cut. "If a contractor tries to extract the best product, he could be creating



Stacks of timber drying out in the summer sun. "The contractor and the grower are both unhappy."

TreeMetrics' laser scanner is used to build a 3D model of the stand. Individual stems are analysed and colour coded according to what product may be cut from them – with different colours for, eg, 4.3m sawlog (16cm diameter), 3.5m pallet (14cm), 3.0 pulp, or waste. The grower, the contractor and the sawmill all know exactly what is available, and where to find it.



waste, and not be rewarded for his work," he said.

David Leslie thought the biggest issue was competition for products, and did not like the idea of a squad of people and adding a pound or two per cubic metre for verification, as in Sweden.

Also, contractors get a different weight in winter, which compensates them for working in difficult conditions. Machines working all year round benefit from better prices in the winter.

Brendan Burns felt sure there must be *some* reasonable method of verification.

Shaun Mochan said that indications from abroad are that volume measurement is cheap and effective, but mills here are traditionally paid by the tonne. "Are we simply afraid of change and of technology?" he wondered.

Donald Maclean said that the FC had studied the problem for a long time before proceeding with volume payment. "How long do you think contractors will continue to invest millions in technology, and not be paid by volume?" he asked David Leslie. He predicted a workers' revolt.

The discussion moved on to calibration. Machines might be calibrated one day, then changed later in the week. "The only solution is more measuring."

Tampering is a fact of life, said Enda Keane of TreeMetrics. This has to be accepted and dealt with properly. Control measures need to be put in place – for instance, an RFID tag on an anonymous tree,

unknown to the harvester operator.

Amidst much talk to the effect that measurements have to remain consistent throughout the supply chain – and David Leslie insisted that, since hauliers wanted to be paid by weight, that would have to remain the case for everyone else – it was pointed out that FC Scotland succeeds in selling log and bar material on a volume basis, whilst at the same time selling small material by weight.

Charlie Fulton interjected that the FC has clout. Buyers wouldn't accept volume measurements anywhere else.

John Paterson added that value of the product is a very different consideration to value per hectare.

Donald Maclean asked whether the fact that weighbridges are calibrated by weights and measures officers lent greater trustworthiness to this method. This brought a general murmur of agreement from some in the audience – to the apparent disbelief of Mr Maclean.

"But weight loss is then the contractor's problem," he said. "How cheap can it be to measure in the harvester head?" he wanted to know.

John Paterson pointed out that not everything that passes through the head ends up on the market.

Brendan Burns was concerned that operators should be rewarded for squeezing out high quality on site. They could start a new job without any idea of what's there, and would have to cut into the timber to find out. They have no idea of the density of the timber, where

the wet ground is – there was a huge lack of help and of data. "Who pays for this?" he wanted to know.

Shaun Mochan said the risk should be shared – it should be a spread cost, not one party's.

Neil Fotheringham asked Neil Murray at what level discrepancies between anticipated and actual output are investigated. Neil Murray replied that if they amounted to just two or three per cent, they would not bat an eyelid. If it stretches further, they would need to be investigated, but this can be due to weather and other factors.

John Paterson wondered which factors were positive for the grower, and which were negative. Half and half, said Neil Murray, adding, with a wry smile, that if the figures were too far on the 'good' side, then they probably wouldn't be investigated as thoroughly! He did however stress that payments would still be in accordance with the conditions of the contract.

"Timber buyers finance their whole operation on the basis of what comes in through the gate. What confidence can the buyer have that head measurement is what he's getting?" was the next question.

Shaun Mochan responded that the TreeMetrics approach would tell the whole story, and would show any errors in the system.

Sawmillers see value in the data, he said, mentioning some prominent names. They would be able to see exactly why a stand had not delivered a predicted volume.

Charlie Fulton said it was all about getting the best value for wood. It makes no sense to sell volume by weight.

Shaun Mochan was asked how change could be brought into the supply chain, given the resistance in some quarters, as well as paralysing inertia.

"In two stages," said Shaun Mochan. "First, by knowing the resource, and secondly by knowing how to cut it to get a validatable outcome."

Laser scanning is accurate, rendering the resource quantifiable. This is interpreted via algorithms that are known to work. They are being refined all the time. The approach to growing stock has to be standardised. James Jones, Scottish Woodlands and BSW all use modified versions of the Blue Book. TreeMetrics uses the Stanford D standard, which is totally independent. The industry needs educating as to how to come to a fair system.

He added that, in the UK, the industry appears to resist change, probably through lack of knowledge and understanding. Training in new and innovative systems is therefore paramount.

Enda Keane added that everyone should start collecting stem data from harvesters with GPS systems, and see how much they could learn from it!

Colin Kennedy, who had chaired the meeting, then called an end to proceedings, noting as he did so that, the way things are at present, a tremendous amount of data is simply going to waste.