

THE PERFORMANCE ON STEEP COUNTRY AT WHITFORD FOREST  
OF A LEIBHERR 721 OWNED BY RALPH DIXON

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INTRODUCTION

Whitford Forest, 35 km to the south east of Auckland, totals 2,000 ha with plantings started in 1952. The land is generally steep but with short slopes, being the headwaters of streams flowing into both Manukau Harbour and the Hauraki Gulf. Soils are Auckland clays, phosphate deficient, lying on greywacke which often shows in stream beds.

Slopes are generally convex dropping steeply into rocky water courses. In addition the ridge pattern is quite distinctive, thus ridge roading is done, although in the past 5 years one major access road has been constructed in an easier valley system.

BACKGROUND TO MACHINE ACQUISITION

Whitford in the 1970's had large areas of untended stands. Dixon was involved from the early first thinnings of this material using an HD6 extracting shortwood heaps in the traditional way.

As the labour force stabilised and the market began to demand longer length pieces - poles, horticultural material etc, Dixon was able to see ahead more clearly. It was obvious that a machine more capable of handling the terrain, and high productivity was required. In addition, Dixon was being asked to do more work outside logging - roading, landings, ripping, stickraking etc. Thus he looked for a machine that was :

- manoeuvrable; it could work in final thinnings on steep country down to 300 sph
- well balanced; for stability
- around 10-12 tonnes so that clearfelling could be done, as well as roading, while still being small enough to second thin.

It is generally agreed that in spite of the step in the dark that Dixon took (his Leibherr was the first one logging in New Zealand) this machine, combined with Dixon's aggressive approach to logging, has enabled steep country to be harvested successfully from an economic, environmental and silvicultural view.

### MACHINE

The LIEBHERR 721 is manufactured by Leibherr of West Germany. The motor is a 6 cylinder Mercedes Benz 105 hp. It drives 2 hydrostatic pumps, one for each track and another hydraulic pump driving the blade and winch.

Weight	12 tonnes
Width	2.5 m (overall)
Height	3.0 m (top of cab)
Length	5.0 m (blade swivel to winch)
Track length	2.5 m
Grousers	20 inch
Ground clearance	275 mm
Rollers	7 bottom rollers

Other machines in the range now made by Leibherr are 711 90 hp, 722 100 hp, 731 140 hp, 71 190 hp, 751 350 hp.

Track gear is identical to the D4. The controls are simple. One lever controls all movement including the facility to drive one track in opposition to the other. One lever controls winch operation and the third operates the blade. Purchased early in 1982, this machine has now done 9,000 hours.

### TERRAIN

This winter's block (compartment 24) is typical of second thinning to 225 SPH at Whitford. Landings are placed on high points at an average of approximately 400 m along ridges on both sides of the block. Distance from ridge to stream averages 200 m. There are no through roads. At the downstream end landings are placed as far "out" as possible, bearing in mind grades for loaded trucks.

Small spurs run down to the stream from the main ridges and an attempt is made to locate landings near the merging of these ideal haul tracks.

A sample of slopes shows that 20° is the average slope within 100 m of the main ridge system, closer to the stream 26°.

The clay here is generally good, especially after the recent dry spells. It comes out well and compacts and seals hard when rolled with rubber.

### CROP

As would be expected in a small forest, Dixon has been asked to handle a variety of crop types including c/f farmers woodlots. However, generally he has concentrated on second production thinning from approximately 400-600 SPH down to 200-225 SPH, or on belated first thinning of older crops, residual stocking being 300 SPH. Due to market demand, we have selected stands in the past by smallwood content, aiming at times for 75-80% smallwood. Now, because of falling demand and the lack of such stands, the proportion is changing so that smallwood forms 30-50% of

production, and sawlog is increasing proportionately.

### Current Area

Compartment 24    54.4 ha P. Radiata planted 1964-65 unpruned  
                  18.0 ha on previous pasture  
                  36.4 ha on felled scrub

Thinned in two operations to approximately 425 SPH average.

- (i) Thin/waste            10.5 ha 1976
- (ii) Production thin    43.9 ha 1979/80    95m<sup>3</sup>/ha

Because of the above, the stand is quite variable;

- (i) On previous pasture stems are large with heavy branching - smallwood percentage drops.
- (ii) In areas thinned to waste 10 years ago stocking tends to be higher giving better smallwood from taller, thinner trees.
- (iii) In production thinned areas stocking can be lower - trees to come out being fewer but larger.

### Constraints

As in all areas, there are constraints on the logging of this block.

- (i) All native areas to be left.
- (ii) An area of long haul with nothing in between - the result of an establishment decision to leave native (which is not criticised).
- (iii) The grove - a picnic area surrounded above and below by Radiata.
- (iv) Heavy topsoil in areas of previous pasture - almost impossible to log in late winter when soils are saturated : on the other hand, this area contains a higher proportion of sawlog which may require logging any time if the mill runs out of log.
- (v) Various treatments of block previously.

### METHOD

#### (i) Gang Composition

1 tractor operator (Ralph himself)  
1 loader operator  
1 skiddy - the most experienced other man in the crew  
2 bushmen

(ii) Logging

The haul track ridges are felled first, right down to the last breakout position.

Some trees which would normally be crop trees are cut from this track as it is important that it be located on the top of the spur (drainage).

The face to be worked is felled from the top of the slope, trees being felled into gaps, (on clay soils tree form is generally better, the crown being long rather than bushy). Hangups are felled at 90° to contour, so that they extract straight up to the machine during breakout. Rubbing stumps are left if the turn onto the track is excessive.

The result of this system is that the steeper the haul track, the more acute the angle of breakout to the track, reducing crop damage.

From the last position on the haul track the trees are felled in a fan pattern, the result being that they still fall 90° to the contour.

On steep areas trees are attached to the stump until breakout begins - the bushmen then making the last cut.

Ralph works right up behind his cutters, alternating between them so that they are working in clean ground. Trees are extracted, untrimmed if necessary and the loader driver assists in trimming. This close hauling has the advantage that in winter, all logs are out each night : thus a decision can be made in the morning by Ralph on where to log, based on weather.

Rope is pulled where necessary. 30-40 m is quite common and in previous areas with longer "dropoffs" 80 m has been pulled.

During the hauling phase dropping and winching in the traditional way is avoided. On steep country, the arch assists the tractor to sit flat on the ground, adding to traction, and if traction is lost the tension is taken off the rope long enough for the tractor to move a few metres, then the load is winched in while still moving forward. Thus the overall pattern of movement on wet and very steep (30°) ground is forward movement at all times, with the winch being used to remove load for short periods until traction is regained.

The logs once under the arch are seldom dropped full length on the ground and this is vital as mud on butt logs (sawlogs generally) is not permitted (the bark being burned for fuel or granulated for sale as horticultural mulch).

PRODUCTIVITY

This varies according to crop type, age, weather and percentage of really steep terrain.

In Ralph's current area, ballpark figures based on some measurements are :

Stems removed	=	200
Stem volume	=	.5 m <sup>3</sup>
Stems/drag	=	3.1
.∴ Volume/drag	=	1.6 m <sup>3</sup>
Time/drag	=	14 minutes
Drags/day	=	30
.∴ Volume/day	=	48 m <sup>3</sup>

Ralph's current target is based on 35 m<sup>3</sup> S/L per day and 20 m<sup>3</sup> smallwood.

