

*Igland winch mounted on John Deere
 skidder*

DOUBLE-DRUM WINCHES IN THINNINGS

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INTRODUCTION

The main advantage of double-drum winches is said to be the accumulation of a larger load of small stems behind the skidding machine. Double-drum winches have been used in Europe for many years but have only recently been introduced to logging operations in New Zealand. This is possibly as a result of increased interest in thinning younger-aged stands.

The opportunity recently arose to evaluate a skidder in a thinning operation, where the single-drum winch was replaced with a double-drum winch. This brief report compares the operation using the two winches and evaluates the potential of double-drum winches in New Zealand. Some of the techniques required for the effective use of double-drum winches are discussed.

ACKNOWLEDGEMENTS

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COMPARATIVE TRIALS

Studies were made of a single-drum winch and a double-drum winch on the same extraction machine in thinning a 9 year old stand in Tasman's Tarawera Forest. The operation was a 7th-row outrow system with selective thinning between the outrows. The topography was flat to gently undulating with very light undergrowth.

The extraction machine was a John Deere 440C skidder. The original John Deere winch and fairlead assembly was replaced by an Igland 5000/2H double-drum winch. The butt plate of the Igland winch was shaped and slotted in over the original butt plate. A slight modification to the winch drive was required. Controls were mounted on the side of the cab and consisted of two single levers hydraulically controlling the two winch drums.

Specifications are given below:

Skidder: John Deere 440C

Power - 52 kW nett

Steering - articulated frame

Drive - four wheel drive with eight forward speeds and four reverse speeds

Travel speeds - 28 km/h maximum

Single-Drum Winch: John Deere

Mechanical drive with hydraulically actuated clutch and brake

Cable capacity - 60 metres of 13 mm cable

Line pull - 4900 kg full drum, 7850 kg bare drum

Line speed - 30 metres per minute bare drum, 48 metres per minute
full drum at 2500 rpm engine speed

Double-Drum Winch: Igland Compact 5000/2H

Mechanical drive with hydraulically actuated clutch and brake

Cable capacity - 2 x 110 metres of 13 mm cable

Line pull - 2000 kg full drum, 5000 kg bare drum

Line speed - 35 metres per minute bare drum, 73 metres per minute
full drum at 540 rpm at P.T.O.

WINCH OPERATIONS

For the single-drum winch operation, trees in the outrow and between the outrows were, if possible, felled for butt extraction. Seven chokers were carried and at least seven logs were hooked on for each drag. On most drags a partial load was broken out and the machine repositioned for hooking on and breaking out the remainder of the load. The three bushmen each felled and prepared seven or eight logs for a drag and waited for the skidder to extract from each in turn.

The same felling pattern was initially tried for the double-drum winch, which had seven chokers per line. There was considerable delay in repositioning the skidder for the 14 choker load. A change to felling for head pulling reduced this repositioning time. To achieve a full load each bushman was required to prepare twice as many logs as with the single-drum winch. Since fitting the double-drum winch an extra bushman was added to the gang.

At the landing long and short logs were segregated and the long logs generally



*Igland winch extracting logs from either side of the
outrow*

dropped off first. With 14 chokers in use problems occurred with the bottom logs becoming buried, and these had to be winched clear for unhooking.

STUDY RESULTS

The study concentrated on the bush and landing phases where the effect of the double-drum winch would be most noticeable. Some information on travel speed was also obtained. The times taken did not include such factors

as machine unavailability, delays, rest, and other contingencies. The results were:

<u>ACTIVITY</u>	<u>SINGLE-DRUM WINCH</u>	<u>DOUBLE-DRUM WINCH</u>
Hook on logs	2.89 min/cycle	4.26 min/cycle
Break out	0.67 "	1.32 "
Reposition in bush	0.27 "	0.10 "
Unhook at landing	1.12 "	2.37 "
Loaded travel speed (flat)	0.68 min/100 m	0.72 min/100 m
Number of logs per load	8.00	12.70

When this information is put together with other data to make up basic cycle times, the cycle time with the double-drum winch is some 33% longer than that with the single-drum winch. Most of the time difference results from extra hooking and unhooking time. Notably, the loaded travel speed with the double-drum winch and greater load, is only marginally slower. The number of logs and hence the volume per drag is, however, some 60% higher with the double-drum winch. The net result of greater volume carried for fewer cycles is a 20% increase in volume produced per day at the landing.

This increase in productivity is gained at the extra cost of the double-drum winch and perhaps the cost of an extra man in the bush. An extra bushman will be required where there is insufficient slack in the original system to allow for up to 20% increase in production per man.

DOUBLE-DRUM WINCH GUIDELINES

Is a Double-Drum Winch Worthwhile?

This question must be asked and answered for each combination of tree size, extraction machine, and topography. The final answer can only be obtained by comparing the extra cost of the double-drum winch and possibly an extra bushman, against the value of the extra wood produced. As an example, a 60 kW skidder in a first thinning operation, where piece size is around 0.15 tonnes, will normally carry 6-8 chokers. Any more tend to become tangled. The average load carried will be well below the capacity of this machine. However, if a double-drum winch is fitted with 12 - 14 chokers, a much larger load can be extracted with the same capacity machine. Care must be taken to see that the capacity of the bushmen and the capacity of the extraction machine are well matched.

Felling and Extraction Techniques

The felling pattern in double-drum winch operations was found to be very important. The diagrams on Page Four illustrate approaches for two different types of terrain.

Diagram One shows a seventh-row outrow system on flat terrain. For seven chokers per line trees are felled with their heads into the outrow. The machine is positioned at the head of the first two logs to be extracted. The left hand rope is taken down the left hand side hooking on the seven trees. Likewise, the right hand side. The machine then has a full drag without having to reposition.

Diagram Two illustrates the technique when felling on uneven country. Extraction tracks are cut along the ridges. The feller works a face long enough to fell seven trees which will be laid out from top to bottom. The machine is then positioned above the first line and the left hand winch extracts the logs in that line. The machine is then repositioned above the second line and extracts with the right hand winch.

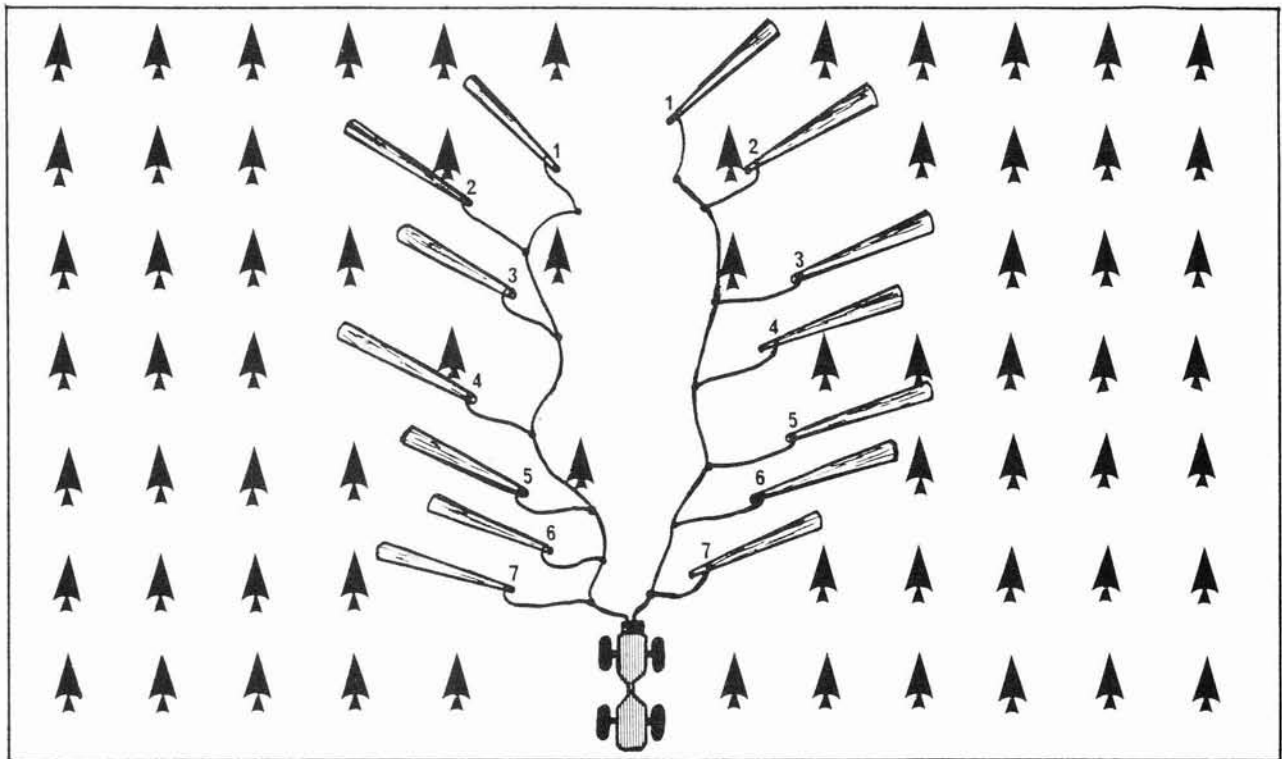


Diagram 1 - Felling and extraction pattern for seventh-row outrow system on flat terrain.

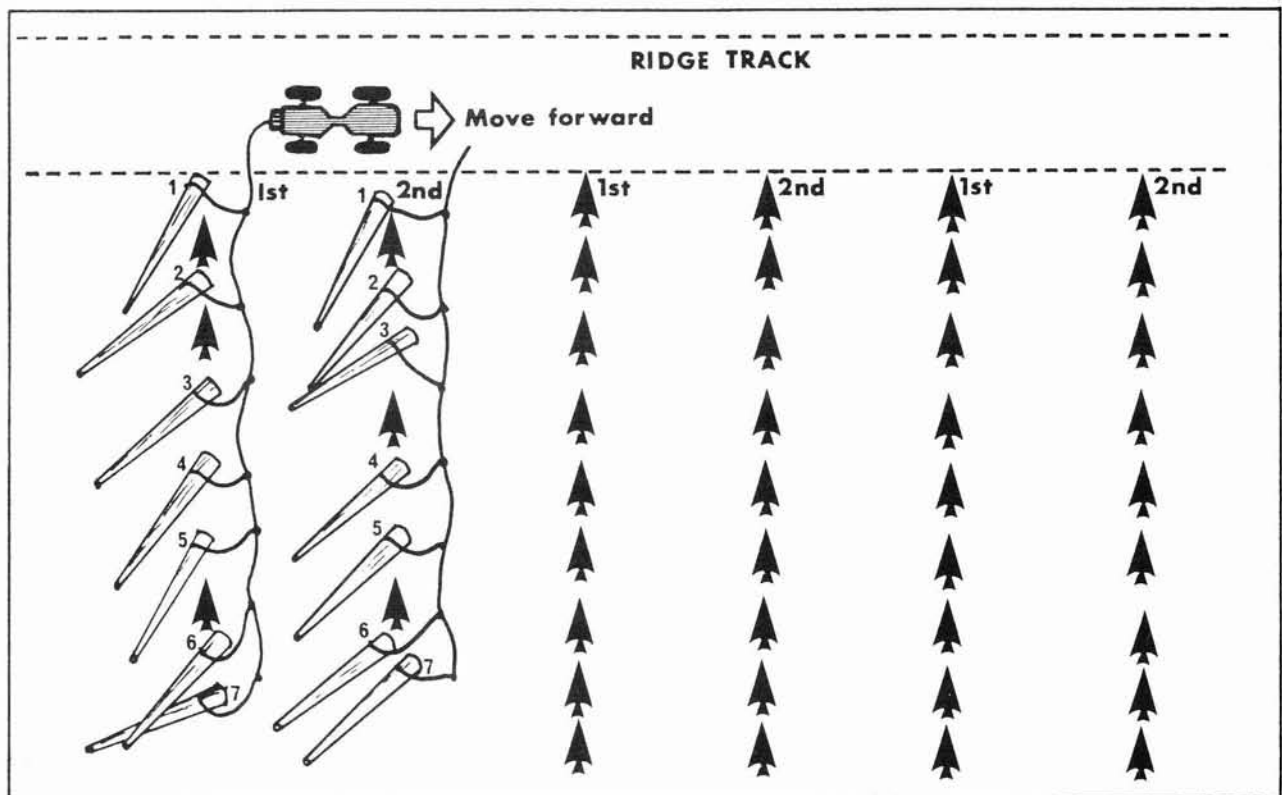


Diagram 2 - Felling and extraction pattern for line pulling on uneven terrain.

To obtain maximum use of the double-drum winch, a felling lever should be used to directionally fell the trees. It is important not to strive for the last log to fill the last choker, especially if this means shifting the machine. The bushmen should fell each drag for the skidder and wait until that drag has been extracted.

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